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FOREWORD

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

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The summary should be a factual and brief recapitulation of the observations or statements contained in the article. The conclusions drawn from the case, experiment, or facts set forth should be clearly stated and should appear at the close.

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All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without the permission of the editor of this *Journal* and that editorial privilege is granted to the editor in preparing all material submitted for publication. Authors are urged to keep their articles short.

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Monthly Message

We point with pride at large Armed Forces medical institutions and list their accomplishments in terms of the superior quality of the more difficult technical procedures completed, or the quantity of disease conditions mastered, and perhaps are prone to overlook the functions and activities of the medical officer stationed with a small dispensary or infirmary. Such a standard of evaluation is most unfortunate for there are many artists in the vast symphony of medical care and each contributes to the orchestral perfection of the final coordinated rendition.

During a recent tour of our Armed Forces medical facilities in Europe, I was proud to note the significant contributions being made to the health of those in uniform by the medical officers manning these smaller units. Theirs is the opportunity of observing health problems during the initial phase at a period when prophylaxis and therapy are most effective. It is at this level of care that a judicious combination of the broader aspects of public health and clinical medicine can be mixed and dispensed with a significant decline in sick-day losses. Actually, under optimum conditions, an alert and intelligent medical officer in the dispensary is in a position to contribute a greater saving of man-hours in the rapid return of patients to duty than a highly qualified specialist functioning in a large hospital.

Correct application of the best principles of prophylaxis and therapy at this level requires on the part of the physician a realization of his limitations both as to material facilities and professional abilities. One must appreciate the fact that certain disease conditions or stages of a disease necessitate further definitive care not obtainable at the smaller medical unit and require reference of the patient to points further along the medical chain of evacuation. This transfer of responsibilities in no wise reflects adversely on the professional capabilities of the medical officer but rather, when judiciously applied, adds to his stature and maturity of judgment.

The close personal relationship existent between the dispensary or infirmary physician and the personnel of the command affords further opportunities for effective contributions to the health of the Armed Forces. Everyday contact and proper physician-patient rapport elevates morale in respect to health matters and develops a respect for the efforts of the medical officer.

Melvin A. Casberg

Melvin A. Casberg, M. D., *Chairman*
Armed Forces Medical Policy Council
Office of the Secretary of Defense

The Armed Forces Medical Policy Council

Hilton W. Rose, *Captain, MC, U. S. N.* (1)

ON 1 July 1952, 18 months will have elapsed since the establishment of the Armed Forces Medical Policy Council. During this period the Council has met regularly every 2 or 3 weeks in Washington, D. C., and during this time has evolved into a smooth-functioning agency.

The establishment of the Council did not come about by accident. It has an interesting historical background. The steps that led to the formation of this Council began in the early days of military unification when a need for a central governing body to provide uniform policies for medical and health matters became apparent.

With the establishment, in September 1947, of the Department of Defense, it immediately became obvious that a critical need for policy direction and control of medical and health affairs existed at the level of the Secretary of Defense. Late in November 1947, 1 month after Congress passed the National Security Act (Unification Act), Mr. James Forrestal, the first Secretary of Defense, attempted to resolve this problem of policy direction by appointing a committee to study and make recommendations concerning co-ordination of medical and health services in the Armed Forces. Secretary Forrestal therefore, on 1 January 1948, created this committee, which he designated "The Committee on Medical and Hospital Services of the Armed Forces," and named as its chairman Dr. Paul B. Hawley, Major General, U. S. Army, Retired. To the Committee he appointed the Surgeon General of the Army, the Surgeon General of the Navy, and the Air Surgeon.

In his memorandum establishing the committee, the Secretary listed a number of matters which he desired to be studied. He pointed out that the Committee would be responsible for the study of all questions of common interest to the 3 medical services with a view to obtaining maximal efficiency and economy in the immediate future through optimal use of hospital facilities, co-ordination of construction plans, co-ordination of medical training programs, establishment of maximal central services, et cetera.

(1) Executive Secretary, Armed Forces Medical Policy Council.

The Committee ("Hawley Board") began intensive work on these subjects and submitted interim reports at various times. Rear Admiral Joel T. Boone, MC, U. S. N., the Executive Secretary, was responsible for carrying to completion the many studies which resulted in the Committee's final reports. From these interim and final reports stemmed many of the changes and programs which have been subsequently recommended and implemented by, first, the Director of Medical Services and, subsequently, the Armed Forces Medical Policy Council. The Committee was dissolved at the time of the establishment of the Division of Medical Services on 1 July 1949.

Meanwhile, the President's Commission on Reorganization of the Executive Branch of the Government (usually called the "Hoover Commission") in 1948 had 2 task forces interested in the problem of coordinating medical and health matters in the National Military Establishment: the Task Force on National Security (known as the "Eberstadt Committee") and the Task Force on Federal Medical Services (called the "Voorhees Committee").

In accordance with the recommendations of these task groups, the Commission recommended to Secretary Forrestal that a civilian committee be established as consultants and advisors to him on medical and health matters. Secretary Forrestal followed this recommendation and formed such a committee, formally naming it the Armed Forces Medical Advisory Committee. As Chairman he appointed Mr. Charles P. Cooper of New York City, whom he also named a Deputy to the Secretary of Defense in the field of medicine and health. The Committee, which soon became known as the "Cooper Committee," consisted of the Surgeons General and the following men, nationally prominent in the medical and health fields: Charles P. Cooper, Chairman; Raymond B. Allen, M. D.; Francis J. Braceland, M. D.; Edward D. Churchill, M. D.; Michael E. DeBakey, M. D.; Paul B. Hawley, M. D.; W. Randolph Lovelace, II, M. D.; Daniel F. Lynch, D. D. S.; Maurice C. Pincoffs, M. D.; Walter H. Scherer, D. D. S.; James S. Simmons, M. D.; Paul Titus, M. D.; Howard A. Rusk, M. D.; and Richard L. Meiling, M. D. *(2)*.

It soon became apparent to the Cooper Committee that a structural weakness existed in the Office of the Secretary of Defense. Although this Committee advised the Secretary and made recommendations on many matters, there was no organization which had the authority to implement or follow through on these recommendations after they were approved by the Secretary. Further, as members on the Committee, the Surgeons General were in the untenable position of advising the Secretary of Defense on the one hand, and receiving through channels this same "advice" for comment in their positions as technical staff officers on the other hand. For this reason the Surgeons General were shifted from membership in the Cooper Committee to the advisory council to the Director of Medical Services. Thus, the Surgeons General lost

(2) The staff of the "Hawley Board" served the Cooper Committee until the Board was disestablished.

their representation on the Cooper Committee. The Committee therefore became a completely civilian body.

The Joint Chiefs of Staff, in February 1949, recommended to the Secretary of Defense that the "Cooper Committee" consider the entire problem of "unification or coordination" of the Armed Forces Medical Services, including the possible development of a "single medical service." After 2 months' study, the Committee suggested to the Secretary that, for the present, rather than create a single medical service he should implement a previous recommendation of the "Eberstadt Task Force," i. e., to establish in the Office of the Secretary of Defense an organization which would have the authority to follow through on the recommendations of the Cooper Committee.

Before this action could be accomplished, Mr. Forrestal was succeeded by Mr. Louis Johnson as Secretary of Defense. Secretary Johnson also concurred in the Cooper Committee's suggestion and in May 1949 established in his office a Medical Services Division (3). To the Director of this Division, the Secretary of Defense for the first time delegated the authority, under his supervision, to establish general policies and programs for the medical services of the 3 departments and to exercise general direction and control over their personnel and facilities. When the Division was reorganized and renamed the Office of Medical Services, the Director of Medical Services was also named "Assistant to the Secretary of Defense for Medical Affairs." The Director established a medical advisory council which consisted of the three Surgeons General and, following the opening of Korean campaign, invited the Surgeon General of the U. S. Public Health Service and the Medical Director of the Veterans Administration to act as consultants to his advisory group. This advisory council met each week.

Thus, there were 2 official bodies in the field of medicine and health functioning within the Office of the Secretary of Defense: the Cooper Committee which advised the Secretary of Defense, and the Director of Medical Services who was responsible for development of the general policies and programs affecting personnel and facilities of the medical services as well as all health affairs in the Department of Defense. The Director of Medical Services met every 2 weeks with the Cooper Committee, but the 2 were established and operated under separate charters.

To overcome this problem, on 2 January 1951 Secretary of Defense Marshall established the Armed Forces Medical Policy Council on the recommendation of Deputy Secretary of Defense Lovett, Dr. Meiling, and General McNarney (Chairman of the Management Committee in the

(3) Dr. Raymond B. Allen, President of the University of Washington and on 3 months' leave from that University, served as Director of the Medical Services Division. On 1 October 1949 this Division was renamed the Office of Medical Services with a Director of Medical Services as its head. Dr. Richard L. Meiling was the first and only one to hold this position.

Office of the Secretary of Defense). The responsibilities and duties of the Armed Forces Medical Advisory Committee ("Cooper Committee") and the Office of Medical Services were combined in the charter of the new council, and the Director of Medical Services was asked to serve as the first chairman of the new Council.

The Secretary of Defense made it clear in the Council's charter that "it shall be composed of a civilian chairman, who shall be a doctor of medicine; the Surgeons General of the Army, the Navy and the Air Force, who shall act for and represent their respective military departments; and three civilian members who, with the chairman, shall be selected by the Secretary of Defense, from among national authorities in medical and health fields of endeavor." The Chairman was also named "Assistant to the Secretary of Defense for Health Affairs." The Deputy Surgeons General of the 3 departments serve as alternates for their respective principals with plenary powers.

Thus for the first time, the Surgeons General had the authority to act for and represent their respective military departments in the formulation of medical and health policy at the highest Defense Department level; and also, for the first time, there existed one body which provided co-ordination of medical policy within the Department of Defense, and between the Department of Defense and other governmental agencies and civilian medical and allied health organizations, agencies and professions. So, after 3 years, the Armed Forces Medical Policy Council came into being.

In general the programs of the Council relate to 3 major fields of activity. They include the co-ordination of the medical aspects of strategic, tactical, and logistic planning with such agencies as the Joint Chiefs of Staff, the Joint Staff, the Central Intelligence Agency, and the National Security Resources Board. The problems of materiel, supply, facilities, and personnel are co-ordinated with the Office of Defense Mobilization, the Munitions Board, the 3 military departments and the 3 Assistant Secretaries of Defense. The third field includes medical and health research, education and training, and other allied subjects which require co-ordination with agencies such as the Research and Development Board, the National Science Foundation, National Institutes of Health, National Academy of Sciences, the Red Cross, the American Medical Association, American Dental Association, American Nursing Association, professional specialty boards, and other outstanding health groups, as well as with government departments such as the Department of State, the U. S. Public Health Service, Veterans Administration, Selective Service, and the Health Resources Advisory Board.

These 3 major fields of activity are broken down into various specialized areas. In the area of personnel and manpower the Council is responsible for the development of policies with regard to the numbers

of physicians, dentists, and auxiliary personnel required by the 3 military departments and the proper use of these personnel by the respective departments, particularly personnel in certain categories and skills which are in short supply.

The Council has been actively engaged in studying the career aspects of military service for medical personnel, the problems of recruitment and procurement, the development of a uniform Reserve program, and the stabilization of medical personnel to the end that a nucleus of trained personnel for medical services exists. Current and future programs include a test project in the Air Force to reduce the time required in physical disability retirements and separations, the study of adequate care of dependents of military personnel, a proposal to establish an emergency maternal and infant care program similar to that in operation during World War II, and an insurance program to supplement medical hospital care now furnished dependents of military personnel.

In connection with medical and hospital facilities, the Council is actively engaged in the development of programs for replacement and reconstruction of hospital services to meet current and mobilization needs, the review of construction plans for medical facilities to insure conformity and economies in construction, better use of personnel, and the maintenance of high standards of medical care in the Armed Forces. Attention is also being given to the development of specifications and testing of surgical instruments and other medical equipment.

The Council is responsible for determining the logistic requirements of whole blood for the Armed Forces, including the amount of blood necessary for overseas shipment, the amounts to be processed into plasma and into serum albumin, and the requirements for transfusion supplies and equipment necessary to support this vital program. In view of the critical needs for whole blood and its derivatives by the military forces in Korea, particular attention is being given to this important problem. Projects are also being continued for the development of a satisfactory plasma extender and for other blood derivatives for use in alleviating the critical shortages of available materials.

The Council is also concerned with the medical and health implications of the Defense Department plans in the event of attack on the United States and provides advice on the medical aspects of chemical and biologic warfare.

In addition to all the above activities, the Council is directly responsible for the policies of such joint agencies (many of which have been established in the last two years) as: (1) the Armed Services Medical Procurement Agency, which is responsible for the purchase, contracting of all medical supplies and equipment; (2) the Armed Forces Medical Regulating Office, which controls the transfer of pa-

tients from overseas theaters to continental United States and between hospitals in the United States, not only in the Armed Forces but from the Armed Forces into Public Health Service and Veterans Administration hospitals as well; (3) the Armed Forces Medical Library; (4) the Armed Forces Epidemiological Board; and (5) the general policies for the publication of the United States Armed Forces Medical Journal and the Medical Technicians Bulletin.

Important liaison activities are maintained with a number of agencies and professional associations to the end that the finest type of medical care is provided the Armed Forces with the most efficient and effective use of professional personnel. These agencies include the Health Resources Advisory Committee, Office of Defense Mobilization, Federal Civil Defense Administration, National Research Council, U. S. Public Health Service and National Institutes of Health, Atomic Energy Commission, Armed Forces Special Weapons Project, American National Red Cross, American Medical Association, American Specialty Boards, et cetera.

Melvin A. Casberg, M. D., former Dean of St. Louis University School of Medicine, has been serving as Chairman of the Council since 1 April of this year (4). Beside the 3 Surgeons General the Council's 3 civilian members are I. S. Ravdin, M. D., Vice President of the University of Pennsylvania and Professor of Surgery at the University of Pennsylvania Hospital, Philadelphia, Pa.; A. R. Shands, Jr., M. D., Medical Director of the Nemours Foundation, Alfred I. DuPont Institute, Wilmington, Del.; and James P. Hollers, D. D. S., of San Antonio, Tex.

The staff of the Council, all military personnel, includes a Brigadier General of the Army, a Rear Admiral of the Navy, and a Brigadier General of the Air Force. Each of these officers heads one of the 3 staff divisions and has assigned to him 2 officers with the rank of Colonel (Army or Air Force) or Captain (Navy). The staff also includes a Secretariat for the Council, headed by the Executive Secretary.

In order to keep policies and plans realistic and reflective of the needs of the operating services, the Chairman, members, and staff of the Council make frequent trips to the field. Believing that emphasis should be placed on the "primary mission" of the military medical service, i. e., the support of the military forces, the Council Chairman and members have made a point of attending field maneuvers of the Army and Air Force and the landing operations of the Navy and Marines.

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(4) Richard L. Meiling, M. D., first Chairman of the Council, resigned in July 1951 in order to return to the Medical School at Ohio State University from which he had been given 2 years' leave of absence. His successor, W. Randolph Lovelace, II, resigned as Chairman on 1 April of this year because of heavy responsibilities at the Lovelace Clinic in Albuquerque, N. Mex. Dr. Casberg, then Vice Chairman of the Council, was appointed Chairman by the Secretary of Defense on recommendation of the Council. Dr. Meiling, at the request of Secretary Marshall and later Secretary Lovett, has continued to serve as a consultant to the Council.

They have participated in high altitude flights to study the medical problems of aviation medicine and in submarine maneuvers to learn the problems of undersea operations and their medical implications.

During 1950, Dr. Meiling visited the European Command and Air Force bases in England. In 1951, he attended the atomic bomb test at Eniwetok and Nevada and revisited certain of the European Command stations and several of the North Atlantic Treaty Organization countries. Last year, Dr. Ravdin inspected medical facilities in Egypt, Greece, and Lebanon, and represented the Council at the Thirteenth Congress of Military Medicine and Pharmacy at Paris. Dr. Hollers has inspected various dental facilities on the East and West Coasts of this country, and Dr. Shands has visited many of the medical facilities in the Southern States.

Last fall, Dr. Lovelace (then Chairman) made a round-the-world inspection trip of U. S. military medical facilities, including those in the Korean combat areas, and returned with many recommendations as well as with a high regard for the quality of medical service he found. In April, Dr. Casberg with several staff members visited a cross section of military hospital facilities in the United States, and on his return urged the Secretary of Defense to expedite the 1952 hospital construction program, previously recommended by the Council. In May, following attendance at the World Health Organization's Fifth Assembly in Switzerland, Dr. Casberg visited our military medical installations in Europe. The Surgeons General report to the Council on the frequent trips they make in this country and abroad as the heads of their own medical services. As a result of these many trips into the field, problems common to the 3 medical services have been presented before the Council, both by the civilian members and by the 3 Surgeons General.

And so 18 months have passed. Although the Council realizes that much remains to be done, it agrees that a great deal has been accomplished in the matter of achieving uniformity and standardization among the 3 services, as well as in carrying out its responsibilities as laid down in the charter. Although still concerned with uniformity and standardization, the Council is concentrating a large part of its attention on other factors which contribute to one of its primary objectives—the advancement of military medicine.

In general, the old adage that the "proof of the pudding is in the eating" can well be applied to the policies which have been developed at the level of the Secretary of Defense in these medical and health fields and which have been implemented by the medical services in every branch of the Army, Navy, and Air Force. Military medicine is now at its highest professional level, the result of which is clearly shown by the present record-setting figures of the recovery of combat casualties—a record far surpassing any comparable achievement in the history of our military services.

Patriotic civilian members of the medical profession, working closely with military medical leaders of our Defense Department, have done much to achieve this record. And the results of this co-operative effort and understanding serve as a tribute to the medical profession of the United States and to the medical officers throughout the Armed Forces.

BOOK REVIEW

Diagnostic and Experimental Methods in Tuberculosis, by *Henry Stuart Willis,* M. A., M. D., F. A. C. P., Superintendent and Medical Director, North Carolina Sanatoria, McCain, N. C.; Consultant, United States Public Health Service; Formerly, Associate in Medicine, The Johns Hopkins University, and Visiting Physician, The Johns Hopkins Hospital Baltimore, Md.; Formerly, Superintendent and Medical Director, Maybury Sanatorium, Northville, Mich., and *Martin Marc Cummings,* M. D., F. C. C. P., Director, Tuberculosis Research Laboratory, Lawson Veterans Administration Hospital, Veterans Administration, Chamblee, Ga.; Instructor in Medicine, Emory University School of Medicine, Atlanta, Ga.; Consultant, United States Public Health Service; Formerly, Director, Tuberculosis Evaluation Laboratory, Communicable Disease Center, United States Public Health Service, Atlanta, Ga. 2d edition. 373 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $10.

This second edition of a manual for diagnostic methods in tuberculosis is up to date and covers the subject in detail. It can in no way be considered a clinical textbook on the subject of tuberculosis but is an excellent manual for diagnostic methods related to identification of the tubercle bacillus. It contains hundreds of helpful facts and suggestions that most of us have learned, relegated to the subconscious, and may have ceased to use. The methods of obtaining materials for study are described and explained in a clear, concise manner. The detail in which laboratory procedures are described, even to the preparation of reagents, makes this a valuable book for all general practitioners and medical students. The bibliography is excellent and the table of contents is skillfully arranged. The book is divided into 3 parts; the first dealing with laboratory diagnosis, the second with related clinical laboratory methods, and the third with methods in experimental tuberculosis.—*Lt. Col. M. E. Groover, Jr., U. S. A. F. (MC)*

Navy Experience With the Oral Use of Penicillin as a Prophylaxis[1]

Robert W. Babione, *Captain, MC, U. S. N.*
Lewis E. Hedgecock, *Commander, MC, U. S. N.*
Jewel P. Ray, *Lieutenant, MSC, U. S. N.*

IN 1947 and in 1948 Eagle et al. *(2,3)* suggested giving penicillin by mouth as a preventive (or more correctly, an abortive treatment) of gonorrhea. With this possibility in view, the Navy began a series of studies which may be divided into 4 phases. Each phase represents a change of study procedure and reveals how the program expanded to its present scope.

PHASE A. DETERMINATION OF EFFICACY AND OPTIMAL DOSE

In the first controlled study in 1948, the Navy in conjunction with the National Research Council and the National Institutes of Health proposed to determine the efficacy of penicillin given by mouth as a prophylaxis for gonorrhea. A continental shore station having a persistently high gonorrheal rate was selected for the study reported by Eagle et al. *(4,5)*. A unit comprised of 350 naval personnel under fairly close medical supervision was divided into a study and a control group. For 16 weeks the study group received 100,000 units of penicillin whether exposed or not, taken as a single peroral tablet on returning

(1) Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy.

(2) Eagle, H.; Magnuson, H. J.; and Fleischman, R.: Relation of size of inoculum and age of infection to curative dose of penicillin in experimental syphilis, with particular reference to feasibility of its prophylactic use. J. Exper. Med. 85: 423-440, Apr. 1947.

(3) Eagle, H.: Effect of size of inoculum and age of infection on curative dose of penicillin in experimental infections with streptococci, pneumococci, and treponema pallidum. J. Exper. Med. 90: 595-607, Dec. 1949.

(4) Eagle, H.; Gude, A. V.; Beckmann, G. E.; Mast, G.; Sapero, J. J.; and Shindledecker, J. B.: Prevention of gonorrhea with penicillin tablets; preliminary report. Pub. Health Rep. 63: 1411-1415, Oct. 29, 1948.

(5) Eagle, H.; Gude, A. V.; Beckmann, G. E.; Mast, G.; Sapero, J. J.; and Shindledecker, J. B.: Prevention of gonorrhea with penicillin tablets. J. A. M. A. 140: 940-943, July 16, 1949.

to the ship from every liberty ashore. The control group received a similar appearing tablet which contained no penicillin after each liberty. Liberties varied in duration from 2 to 22 hours with the mode at about 7 hours. Exposures occurred closer than this to the time of taking the tablet, the estimated mode being less than 2 hours from the time of exposure to the taking of the tablet.

For the first 3 months, the 100,000 unit dose appeared ample, but when cases began to appear in the treated group, the dose was increased to a 250,000-unit tablet. Subsequently it was discovered that the motivation for a tablet after every liberty had begun to fail and tablets were being surreptitiously thrown away. A tighter supervision was applied for the remaining weeks and on the 250,000-unit regime, no cases were observed among men who were unquestionably protected after every liberty. After 24 weeks of controlled study, 250,000-unit penicillin tablets were made available on a voluntary basis to the entire station, and for the first time were specifically recommended for the prevention of gonorrhea. Table 1 and figure 1 indicate the findings of the study.

Summary of results in the prevention of gonorrhea with penicillin used orally:

1. Controlled study (24 weeks): In the first 16 weeks, the experimental group received a single 100,000-unit tablet of penicillin G and in the last 8 weeks, a 250,000-unit tablet. There was a single questionable failure in the latter group.

2. Volunteer study (8 weeks: 250,000-unit tablets available on request): In those taking the penicillin there was a single questionable failure in a case developing 7 days after a penicillin "protected" liberty. In the meantime, however, the subject had been on unauthorized leave for 5 days with repeated exposures.

Daily tablets were administered to a few selected men to test for possible sensitization. No clearly defined penicillin reactions were observed.

PHASE B. DETERMINATION OF RESULTS WITH DELAYED ORAL ADMINISTRATION

Serologic tests for syphilis (STS) were required at 4-month intervals on men participating in this controlled study. Their sexual and prophylactic habits were recorded. A naval force operating in the European-Mediterranean area with high venereal disease rates was chosen and the observations were reported by Campbell et al. *(6)*. In this study those in the treated group, composed of men with odd service numbers, each received a 200,000-unit dose of penicillin by mouth the morning after

(6) Campbell, V. W. H.; Dougherty, W. J.; and Curtis, C. E.: Delayed administration of oral penicillin as prophylaxis for gonorrhea. Am. J. Syph., Gonor. & Ven. Dis. 33: 437-443, Sept. 1949.

TABLE 1. *Effect of a single peroral tablet of penicillin on the incidence of gonorrhea**

		Control group (no penicillin)	Experimental group	
			100,000 units	250,000 units
Duration of study		24 weeks	16 weeks	8 weeks
Number of subjects**		137-217	151-213	87-141
Number of liberties		3,616	3,218	569
Number of cases***		43	5	0 (1?)
Incidence of gonorrhea †	Per 1,000 men per year	508	105	
	Per 1,000 liberties	11.9	1.8	

*Reprinted from footnote reference (4).

**The figures in this row represent the variations in the total number of subjects in each group during single 4-week periods of the study. Men were included even though they may have been in the study or in the group for only a fraction of that period. This figure is, therefore, somewhat greater than the average number of subjects in the study. In consequence, the rates per 1,000 per year given in the table are somewhat lower than was actually the case.

***These figures do not include a total of 9 cases of gonorrhea which developed in men supposed to have taken penicillin, but who are known definitely not to have taken the drug after the leave in which the infection was contracted, either because they refused, because the leave was unauthorized, or because of the laxity of the watch in charge of dispensing tablets. These cases should obviously not be included in assessing the efficacy of the procedure. By the same token, however, there must have been many others in the experimental group, supposed to have taken the drug, who failed to do so. (See footnote †) The total of 5 failures charged to the experimental group receiving 100,000 units of penicillin includes 3 cases in which there was no record on the individual card that the penicillin had been taken, and which may therefore not have been penicillin failures. They have nevertheless been treated as failures in the calculations because there was no proof that the tablets had not been taken.

†Because some of the men supposed to receive penicillin actually failed to do so, in calculating these rates an attempt has been made to correct for these omissions. If in a given month there were, e. g., 10 cases in a control group of 200 men, with a total of 500 liberties, and if in the same period there was, e. g., 1 case in the supposedly experimental group, who failed to take penicillin, it is assumed in calculating the rates that 1/10x200=20 men in the experimental group had failed to take the drug, and that this had occurred in a total of 1/10x500/50 liberties. The values so calculated have been subtracted from the totals in the experimental group in calculating the rates per 1,000 men per year, and per 1,000 liberties. The correction is obviously approximate, but to exclude the cases developing in subjects who had failed to take penicillin without at the same time changing the base figure would result in rates biased in favor of the prophylactic procedure.

each of 1,832 exposed liberties at intervals varying from 12 to 20 hours after exposure. A control group, composed of men with even service numbers, received a placebo of the same appearance at the same time after 1,891 exposed liberties. Continuance of all standard prophylactic measures was urged. It was found that the prophylactic effect of oral penicillin on gonorrhea diminished with increase of time

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between exposure and the ingestion of the penicillin tablet. A 200,000-unit dose taken on an average of 14 hours following exposure gave a 58 percent reduction in gonorrheal incidence; 9 cases occurred in the penicillin-treated group, and 22 in the group receiving the placebo.

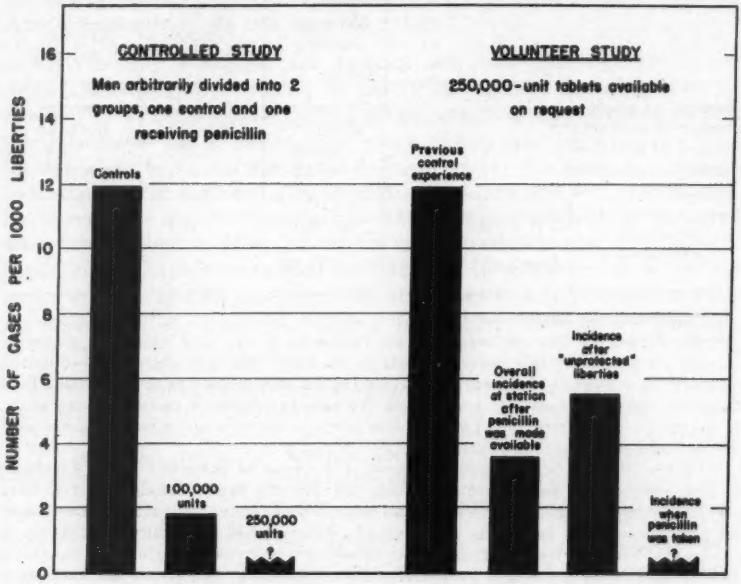

Figure 1. The prevention of gonorrhea with penicillin used orally. (Reprinted from footnote reference (4).)

The results of these 2 studies were considered significant enough to warrant further study in areas having a high venereal disease incidence. In all subsequent studies 250,000-unit penicillin tablets were used.

PHASE C. LIMITED USE WITHOUT PLACEBOS

This phase included studies 3 through 7. Records indicating the previous experience of the same ship or the current experience of other comparable ships in the same area not using penicillin tablets as a prophylactic measure were used as controls. STS's were required at 4-month intervals on men participating and their sexual and prophylactic habits were recorded.

In studies 3, 4, and 5, three large ships operating during different periods in areas of high venereal disease incidence (European-Mediterranean) were used. Studies 3 and 4 were conducted by Keeton (U. S. S. *Philippine Sea*) and Messersmith (U. S. S. *Coral Sea*). In comparison with previous experience of the same ship in the same area,

study 3 with 42 percent of its liberties followed by a penicillin tablet achieved a 75 percent reduction in gonorrheal incidence whereas study 4 with only 12 percent of its liberties followed by a penicillin tablet achieved only 21 percent reduction. Study 5 by Hedgecock (Venereal Disease Control Section, Bureau of Medicine and Surgery, Department of the Navy) indicated an 85 percent reduction in gonorrheal incidence on the treated ship as compared with an approximately equal untreated group on other ships in the same port at the same time. Actually 100 percent protection was achieved because the 2 cases in the treated ship occurred in men who had not taken tablets (table 2).

When the men became aware of the program it was soon impossible to withhold treatment on control ships because many believed that they were being denied the use of a very effective drug. During the latter part of this phase, studies 6 and 7 were made with all ships and personnel in the Mediterranean area. These studies continued to require STS's each 4 months on the men taking part in the program. The sexual and prophylactic habits of the group were recorded during this phase.

Study 6 involved 24 ships operating in the Mediterranean area between September 1949 and January 1950. A total of 12,009 men was represented in this study. A reduction in the gonorrheal incidence of 74 percent over previous experience was obtained with the oral use of penicillin as additional prophylaxis in this group (table 3). Study 7 included 20 ships in the Mediterranean area with a total of 8,862 men. The number of cases of gonorrhea per 1,000 liberties was somewhat higher than that observed in study 4, but study 4 had had most of its unprotected liberties in relatively clean ports. The incidence of syphilis in study 7 was unusual and deserves further consideration. Table 4 shows the results of the 1949-1950 studies in the Mediterranean area with regard to the oral use of penicillin, gonorrheal incidence, and syphilitic incidence.

With the exception of study 4, the percent of liberties following which a penicillin tablet was requested was fairly uniform for the several studies. The percent of men requesting penicillin tablets after liberties was influenced by the amount of indoctrination received previously as to the oral use of penicillin as an additional protection and by the availability of sexual partners. In ports where promiscuous women were hard to find, the use of penicillin was lower. The higher total gonorrheal incidence in studies 7 and 8 is partly a reflection of less intensive efforts to indoctrinate the men to take a tablet after every exposure. Many so-called prophylactic failures were thus questionable failures because some men admitted taking tablets only part of the time. In the determination of a real versus a "questionable" penicillin failure, if both protected and unprotected exposures occurred at least 2 and not more than 13 days prior to the onset of the disease, it was considered to be a questionable failure, but was included in table 3 as a failure.

TABLE 2. *Summary of study 5*

Group	Men	Liberties		Exposures		Liberties protected by penicillin		Hours between exposure and taking penicillin		Venereal disease cases					
	Total number	Granted	Exposed	Men exposed	Total contacts	Penicillin plus other prophylaxis	Penicillin only	Range	Median	GC	S	C	L	GI	Total
Study	1,612	4,500	638	460	649	421	217	1-86	3.04	2*	0	2	0	0	4
Control	1,790	5,625	429	328	453	0	0	-	-	16	1	1	0	0	18

* The 2 cases of gonorrhea occurred in men who did not report exposure and did not take a penicillin tablet.

GC = gonorrhea
S = syphilis
C = chancroid
L = lymphogranuloma venereum
GI = granuloma inguinale

TABLE 3. *Venereal disease rates of 2 groups of ships in the Mediterranean for 4-month periods, 1949 and 1950*

Period of observation	Penicillin by mouth	Total admissions		Gonorrhea		Syphilis		Other	
		Number	Rate per 1,000	Number	Rate	Number	Rate	Number	Rate
4 months 1949	Not given	461	167	420	152	19	6.9	22	8.
4 months 1950	Given	177	44	159	40	4	1.	14	3.5
Reduction in rate, 1950 compared with 1949 (percent)			74		74		85		56

Even with this bias against the oral use of penicillin, less than half of all gonorrheal cases occurred after the "protected" liberties, which in most studies comprised 95 percent of all exposures. This is consistent with better than 90 percent protection.

The figures in table 4 indicate a partial protection against syphilis, except in study 7. The ratio of gonorrhea to syphilis was 30 to 1 for some time before the beginning of penicillin prophylaxis. If the incidence of syphilitic cases remained high while gonorrhea was reduced, the ratio would fall. Only in study 7 did it fall remarkably, and this group had an unusually heavy incidence of syphilis. In the other studies, ratios of 16:1 to 25:1, as seen in table 3, would tend to show that syphilis was reduced by a percent at least half of the reduction achieved in gonorrhea. The numbers of cases were small and this finding is not conclusive.

It is of historical interest that in May 1950 penicillin tablets were made available for general use as a prophylaxis in the European-Mediterranean, Japanese, Philippine, Chinese, and the West Indian areas, but their use was not required. Phase C requirements were still imposed in that every tablet taken was to be recorded with exposure data and every case of gonorrhea was to be analyzed against this record for evidences of failure. In practice this was not well carried out and the administration of the tablets was unequally accepted by the men and pushed by the commanders on various ships. STS's were required at 4-month intervals as part of phase C controls. Increased emphasis was placed on the importance of using other generally recognized forms of prophylaxis after May 1950 because of the experience of study 7. The rise in syphilis between January and May 1950 in the Mediterranean was caused by over-confidence in the oral use of penicillin as a total prophylaxis and lack of knowledge as to its shortcomings in the prevention of the other venereal diseases. The increase in chancroid in the Navy after the beginning of the Korean campaign is believed due partly to the same trend, but mainly to large movements of personnel to the Far East. Table 5 is a composite of all studies made during 1949 and 1950. Because exposures in the Far East were even higher than in the Mediterranean, the 30 percent of protected liberties actually mean a much lower percent of protected exposures in the Pacific Fleet. This is known to be the fact as many ships did not use penicillin at all in this area during 1950.

Some of the difficulties encountered in the Navy studies when penicillin tablets were released for general use in authorized areas were: (1) reluctance of some medical officers on various theoretical grounds to adopt penicillin tablets when made available, (2) STS's were impossible to perform in all personnel at the required intervals during phase C and some medical officers held back for this reason, (3) failure of men to use penicillin tablets when it necessitated standing

TABLE 4. *Penicillin prophylaxis studies, Mediterranean area*

Study number	Date	Liberties		Cases per 1,000 liberties			
		Thousands	Percent requesting penicillin	Gonorrhea		Syphilis	Ratio of gonorrhea to syphilis
				Total cases	Cases in men who took penicillin*		
3	Nov 1948 May 1949	23	42	0.75	0.14	0.04	19:1
4	June-Sept 1949	76	12	1.16	0.14	0.06	19:1
6	Sept 1949 Jan 1950	130	59	0.98	0.44	0.04	25:1
7	Jan-May 1950	152	43	1.54	0.76	0.46**	3:1
8	May-Aug 1950	106	44	1.56	0.36	0.1	16:1

*Cases occurring in men *all or part* of whose liberties were protected by penicillin.

**During study 7, 68 cases of primary and 2 cases of secondary syphilis were diagnosed. Sixty-two of the 70 men had participated in the oral penicillin study (how regularly or irregularly is unknown). The number of tablets varied from 1 to 24 (median 4). The duration over which usage extended varied from 1 day to 17 weeks (median 6 weeks). No early latent syphilitic cases were reported from one ship that reported 33 primary cases. This frequency of syphilis was definitely abnormal and was associated with a widespread abandonment of other prophylactic methods, which was partially corrected in subsequent studies.

TABLE 5. *Penicillin prophylaxis studies, total areas of use*

Area	Liberties		Cases per 1,000 liberties				Ratio	
			Gonorrhea					
	Thousands	Percent requesting penicillin	Total cases	Cases in men who took penicillin*	Syphilis	Chancroid	Gonorrhea to syphilis	Gonorrhea to chancroid
Mediterranean	757	39	1.32	0.42	0.26		5.2:1	
Japan-Philippines China	476**	31**	2.34	0.86	0.0316	1.52	74:1	1.5:1
West Indies Caribbean	103	18	1.7	0.1162	0.0968	0.1646	17.5:1	10.3:1
European	17	21	1.8	0.66	0	0	0	0
Total	1,353	34	1.7	0.54	0.1594	0.58	10.7:1	21:1

*Cases occurring in men *all or part* of whose liberties were protected by penicillin.

**These figures represent only those ships which used tablets and submitted reports, and for these it does not cover the entire year. No data are available from ships which did not participate in phase C studies in this area.

in line or other inconvenience to obtain them, (4) failure of men to complete questionnaires concerning sexual and prophylactic habits ashore, and (5) entries regarding use of penicillin prophylaxis and serologic follow-ups that were placed in health records led to embarrassment and marital difficulties with some of the men on return to the United States.

PHASE D. GENERAL USE BY ALL SHIPS AND PERSONNEL IN ALL HIGHLY ENDEMIC AREAS

Starting in January 1951, the requirement for STS's every 4 months and the recording of sexual and prophylactic habits ashore were discontinued.

During this phase the oral use of penicillin on ships and at stations as a protection against gonorrhea increased by 50 percent chiefly because it became mandatory that ships of the Pacific Fleet make this method available to their men. Some individual ships and stations continued to maintain accurate records of prophylactic habits, reactions, penicillin failures, STS's, et cetera. The findings of these ships, together with those of the organized studies, are considered in the discussion.

DISCUSSION

Certain questions have been asked. These with the best answers currently available are given.

Why is the oral use of penicillin as an abortive treatment for gonorrhea not extended to include continental United States?

The incidence of gonorrhea within the United States is now so low that with the continuance of present prophylactic habits it is estimated that 2,000 tablets or more might have to be expended to prevent a single case. The cost entailed is not justified.

Does the oral use of penicillin prevent any of the other venereal diseases?

Doses of from 100,000 to 250,000 units are known to prevent gonococcal urethritis. It is possible, and even probable, that doses of 250,000 units will prevent syphilis when the inoculum is small and all the treponemas are caught in their dividing phase by the high penicillin blood level, but failures are numerous. In longer courses and larger doses, penicillin tablets could be used effectively, but this is not considered practical.

Does the oral use of penicillin as a prophylaxis mask the early signs of syphilis resulting in a completely symptomless infection?

No evidence of masking of the early signs of syphilis has been found. Patients with primary syphilis having treponemas in the darkfield are seen frequently enough to give the assurance that chancres are not

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modified, if syphilis is acquired at all, even in those men who take as many as 22 tablets in a single month. In one instance, 22 men were exposed to the same girl in Naples. All took from 3 to 11 tablets on this and other subsequent exposures and 9 developed a primary chancre within from 3 to 5 weeks. There are suggestions that some absolute prevention of syphilis has occurred. Hollander et al. (7) demonstrated in rabbits that long continued subcurative doses of penicillin did not result in symptomless infections. There may be a delay in the appearance of a chancre, but it will not be "masked." No cases of latency with positive serologic tests for syphilis have been found with absence of early signs.

The National Research Council indicates that there is virtually no likelihood of masking symptoms of early syphilis with the small amount of penicillin used orally for prophylaxis. The larger doses of penicillin that are used for diseases other than venereal are a matter of greater concern in this respect if they fall in the range of therapy with a low percent of cures. A special search for latent syphilis was made among men who participated in oral penicillin studies 3, 4, and 6 in 1949. In these studies, 14,924 men participated by taking from 1 to 35 penicillin tablets over a period averaging 15 weeks. Of this group, 7,098 or 48 percent were given STS's in from 3 to 4 months following the completion of their respective studies. Nonparticipants were given serologic tests for syphilis also.

Analysis of syphilitic cases.

1. Primary and secondary syphilis: There was a total of 15 patients, only 4 of whom had participated in the oral penicillin study. The remaining 11 had not taken tablets. This is suggestive of some protection in view of the fact that most of the exposures were protected by penicillin.

2. Latent syphilis: Twelve cases were reported. One patient had a history of a penile lesion; 1 was diagnosed on a positive presumptive Kahn test only; 2 were diagnosed and treated on 2 plus Kahn tests only; and 3 had not participated in the penicillin prophylaxis study. An analysis of the remaining 5 patients is shown in table 6. Unfortunately, the state of STS's in most of these men just before starting the oral use of penicillin is unknown. Except for case 12, none had taken penicillin for several months when the survey was made. With 3 latent cases discovered among men who had not taken penicillin tablets (a small minority of the sexually promiscuous group, it may be safely assumed), the 5 cases of latent syphilis among those who took penicillin is not more than would have been expected had penicillin not been given at all.

(7) Hollander, Turner, and Nell: Effect of long continued subcurative doses of penicillin during incubation period of syphilis. Unpublished. Naval Research Contract No. N6 ONR-24322.

Although 52 percent had been transferred to other activities, or had not received a follow-up STS on board the study ships, a request for such a follow-up was incorporated in their health records, as well as a request for the special reporting of all syphilis cases to the Bureau of Medicine and Surgery, if in the opinion of the medical officer, the patient had acquired syphilis during a penicillin prophylaxis study. No such special reports were received.

TABLE 6. *Analysis of 5 patients with latent syphilis who had participated in penicillin prophylaxis studies*

Case	Total number of tablets taken	Period of observation (weeks)	Time between last tablet and diagnosis (months)
5	10	5	6.5
8	5	13	2.5
9	5	10	5.7
10	3	1	7.5
12*	?	13 (approx.)	0.5**

*No card in file.
**15 days after oral penicillin was stopped in this group.

Following this inconclusive finding, it was deemed necessary to try some additional approaches if valid answers on latent syphilis were to be obtained within any practicable period of time. Accordingly it was decided to obtain information on the total penicillin received for any reason prior to the diagnosis of each case of latent syphilis in the entire Navy. Therefore, all cases of latent syphilis reported to the Bureau of Medicine and Surgery on "F" cards since March 1950 were studied by means of a questionnaire in order to determine to what extent penicillin had been used by these patients for all causes during the period in which the disease might have been acquired. As of January 1951, 240 report forms on latent syphilitic cases had been received and analyzed. The following information was revealed: (1) 49 patients had a past history of treatment for syphilis, (2) 56 had a history of lesions or rash suggesting early infectious syphilis, (3) 6 had been incorrectly diagnosed, and (4) 129 were diagnosed early latent syphilis solely on the basis of positive STS's and without a history of a lesion or a rash.

Of the total true early latent syphilitic group, 38 patients had received penicillin treatment for other diseases. In 18 of these the disease treated was gonorrhea. In 2 patients no record was available as to the total amount of penicillin received and of the 36 receiving a known amount of penicillin intramuscularly the total dosage range was from 0.3 to 6 (median 0.9) million units. Of the

129 patients with proved early latent syphilis in the entire Navy, only 17 men had been present where penicillin tablets were available. Of these, only 15 men had actually taken the tablets during the penicillin prophylaxis studies (usually 90 percent or more take the tablets). From this analysis, it is concluded that the incidence of latent syphilis is no greater in those who do than in those who do not take penicillin tablets. Furthermore, the fact that 38 out of the 129 had had prior treatment with penicillin suggests that penicillin therapy for other diseases masks *fewer* cases than it cures because it is estimated that more than 1 out of 4 nonsyphilitics have had penicillin.

Will penicillin used orally on a large scale cause the gonococcus or Treponema pallidum *to develop strains resistant to penicillin?*

No strains of gonococci resistant to penicillin have been found. The dosage schedule of penicillin tablets is much less likely to produce this result than are schedules resulting in prolonged low levels obtained by using penicillin in oil. Exact measurements of sensitivity by the National Institutes of Health show gonococci to be uniformly sensitive to the same levels of penicillin they always have been. Hollander et al. (7) found that 20 subcurative treatments for syphilis did not increase the resistance of *T. pallidum* in rabbits.

Is the fact that gonorrhea today seems to require larger amounts of penicillin for a cure than were required a few years ago an evidence of resistance?

Continuing urethral discharges or relapses following treatment for gonorrhea are often noted and erroneously designated resistant gonorrhea, but these discharges show absence of gonococci unless there has been reinfection. The condition is believed to be invariably due to other organisms or to some anatomic condition, not to gonococcal resistance. Research on the problem of nongonococcal urethritis, the source of most of the confusion, is being undertaken. Penicillin tablets may have contributed to a rise in prevalence of nongonococcal urethritis to the same extent that it has led to disuse of mechanical prophylaxis by many men. The reduction in gonorrhea, however, far outweighs this increase. Adding all venereally acquired urethritis together, the situation is still improved by the oral use of penicillin.

Has the oral use of penicillin increased promiscuity?

Before penicillin tablets were available, studies were made to determine the percent of personnel who sexually exposed themselves in various ports and situations and how frequently during a given period of time. Great variations, depending on many factors, are the rule. In comparing this data with those which have been received after the introduction of penicillin tablets, it is impossible to arrive at a valid conclusion. Some got the impression that the new method stimulated some men to expose themselves who otherwise would not have done so.

If there was any overconfidence or novelty it is believed that this has entirely worn off in all vessels where penicillin tablets have been in use for a number of months and that the exposure rate has settled down to its former constants, depending on the availability of promiscuous women, age, length of service, distance from home in time and space, et cetera. There is no evidence that the oral use of penicillin where it has become a well-established routine is now contributing to increased promiscuity.

Has the oral use of penicillin resulted in some abandonment of other prophylactic methods?

There is no doubt that penicillin tablets are greatly preferred by the men to either condoms or prophylactic tubes for convenience and esthetic reasons. In the beginning, many men were not aware of the limitations of oral tablets as a prophylaxis and gave up use of other prescribed methods. In one questionnaire study it was found that as many as 22 percent of the personnel discontinued the use of condoms and hygienic cleansing when oral tablets were placed on board the ship. It is believed that this trend reached its peak at the time of study 7, which partly accounted for the high incidence of syphilis in that study. This has been largely overcome through education. Emphasis should continually be placed on the use of mechanical prophylaxis, and especially on thorough cleansing with soap and water. Chemical prophylaxis applied to the external genitalia is of less value and will shortly be replaced by an antiseptic soap on which studies have been begun. A complete bath or shower on return to the ship or station should also be recommended in all cases.

Do men using penicillin tablets for prolonged periods become sensitized to penicillin?

This question cannot be positively answered. Penicillin reactions in the general public and in the Navy appear to be becoming more frequent and possibly more severe. This impression definitely existed before oral penicillin prophylaxis was used extensively in the Navy. A recent analysis of the incidence of reported reactions to penicillin by Kitchen et al. *(8)* revealed that the total number of reported reactions to penicillin has not risen as fast as has the amount of penicillin administered in the United States. It appears that the incidence of reactions to penicillin is falling in relation to the trillions of Oxford units of penicillin which have been prescribed. This problem, along with other aspects of penicillin prophylaxis, has been under investigation in the Navy.

Of the thousands who have taken part in these studies up to January 1951, including a few who took 20 or more tablets per month, there have been only 37 reactions reported in persons who used penicillin

(8) Kitchen, D. K.; Rein, C. R.; Thomas, E. W.; and Spoor, H. J.: Reactions to penicillin. Am. J. Syph., Gonor. & Ven. Dis. 35: 578-582, Nov. 1951.

tablets. Analysis revealed that 6 of the 37 had received penicillin by *injection* for some other purpose; therefore, it is difficult to evaluate what part the tablets had in producing the reaction in these patients. Twenty-two of the reactions were quite minor (urticaria) and developed following the first tablet, indicating prior sensitization. From all of the studies, there appears to have been little, if any, sensitivity developing from the use of penicillin tablets as a prophylactic measure.

Why is gonorrhea still seen in groups using penicillin tablets?

Analysis of all studies indicates that the patients developing gonorrhea in ships where penicillin tablets are made available (1) took no precautions whatsoever, (2) took no penicillin tablet, (3) took a tablet at periodic intervals and not after every exposed liberty, or (4) had been exposed several times on any one liberty and that the interval from first exposure to taking the tablet was over 12 hours. (One ship recorded 7,000 tablets taken in a highly infectious port without a single case occurring in the several thousand men who took tablets.)

What is the effect of penicillin tablets on the total venereal disease rate?

The total venereal disease rate in areas where they have been widely and well used showed a reduction of more than 50 percent. At the same time where ratios of gonorrhea to chancroid to syphilis have been 30:3:1, ratios have been recorded as low as 3:6:0.5 in the most carefully controlled study. This result varies widely, depending on usage. As penicillin tablets are not available to all naval personnel, the effect of the penicillin prophylaxis program on the total venereal disease rate cannot be evaluated, but it can be stated that in those activities operating in areas of high gonorrheal incidence where penicillin tablets are used and judiciously encouraged, the incidence of gonorrhea has been reduced as much as 90 percent. As the greatest part of the venereal disease rate of any activity is a reflection of the gonorrheal incidence, marked reductions in venereal disease rates have been achieved in activities which have reduced their gonorrheal incidence by the oral use of penicillin. Many ships using penicillin tablets now report their gonorrheal incidence to be as low in foreign ports as it is when in United States ports.

What is the policy regarding the use of penicillin as an abortive treatment for syphilis?

Penicillin prophylaxis for syphilis is not authorized as a routine. If penicillin prophylaxis for syphilis is desired for a special reason, i. e., exposure to a *known* case, the dose should be 600,000 or 1,200,000 units of procaine-penicillin intramuscularly with follow-up as for patients with early syphilis treated in the usual manner.

Is sulfadiazine used with penicillin tablets approved as a prophylaxis for chancroid?

Sulfadiazine is not approved as a prophylaxis because of: (1) its toxicity, (2) the development of resistance or "fastness" by organisms, (3) absence of any evidence that it is effective in the dosage recommended, (4) its interference with the bactericidal action of penicillin, and (5) the lower incidence of chancroid, and its amenability to control by soap and water.

SUMMARY

1. Penicillin given by mouth in doses of 250,000 units within a few hours after exposure has been shown to be nearly 100 percent effective in preventing gonorrhea.

2. It is more readily accepted than either mechanical or local chemical prophylaxis, but usage varies widely with the emphasis given. Some medical officers discourage its use on theoretical grounds.

3. Its efficacy has remained unchanged after 3 years of use and resistant forms of gonococci have not been encountered. It is extremely improbable that this method of administration will have any influence on the development of resistant forms of either the gonococcus or *T. pallidum.*

4. Its ability to prevent syphilis in doses of 250,000 units by mouth is suggested, but it is not dependable. It will almost certainly fail in the presence of heavy inoculums.

5. It has shown no indication of altering or masking the evolution of primary and secondary syphilitic lesions in those it fails to protect.

6. It has produced no increase in frequency of latent syphilis, as seen by serologic follow-ups, total cases, and by analysis of each latent case during 1950. Further investigation is required.

7. It tends to lead to abandonment of mechanical and chemical prophylactic methods if indoctrination is careless. This in turn leads to increase of chancroid, nongonococcal urethritis, and, if extreme, syphilis as well. This carelessness can be largely overcome.

8. The question of penicillin sensitivity is still open. Most cases have been mild, and have occurred after the patient took the first tablet. The severe penicillin reactions reported have almost all been clearly due to intramuscular usage and intramuscular sensitization. Impressions that the oral use of penicillin has caused sensitization are unconfirmed.

9. Penicillin tablets containing 250,000 units are recommended as a prophylactic measure against gonorrhea in high incidence areas only and with proper indoctrination as to their limitations.

Grateful acknowledgment is extended to Abbott Laboratories, Charles F. Pfizer, Lederle Laboratories, Inc., Schenley Laboratories, Commercial Solvents Corporation, The Upjohn Company, Eli Lilly and Company, and Sharp and Dohme who supplied the penicillin tablets for studies 1 to 5 without cost to the government. (The Commercial Solvents Corporation also supplied the placebos used in study 2.)

BOOK REVIEWS

Etiology and Diagnosis in the Treatment of Infertility in Men, by *Robert S. Hotchkiss,* M. D., Professor and Chairman, Department of Urology, New York University, Post Graduate Medical School, Visiting Surgeon-in-Charge (Urology), Bellevue Hospital, Visiting Surgeon-in-Charge (Urology), University Hospital. American Lecture Series Publication No. 53, A Monograph in American Lectures in Endocrinology. 73 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.50.

This monograph covers the basic etiologic factors and diagnostic principles in infertility in men. Clear, concise, easily readable and understandable discussions of embryology, anatomy, and physiology; formation of seminal fluid and metabolism of spermatozoa; clinical history and physical examination; laboratory tests and special examinations; collection and detailed analysis of semen; factors influencing testicular function; inter-relationship of the endocrine glands, and the technic and interpretation of testicular biopsy are presented. This valuable contribution contains information which is necessary to the young practitioner or undergraduate who intends to go forward in the relatively new and unexplored field of male infertility.

—*Maj. A. B. Peyton, MC, U. S. A.*

Hemifacial Spasm, A Clinical and Pathophysiological Study, by *Robert Wartenberg,* M. D., Foreword by *Macdonald Critchley,* M. D. 86 pages; illustrated. Oxford University Press, New York, N. Y., publisher, 1952. Price $4.

This small monograph presents a thorough discourse on the problem of preternatural or excessive mobility (hyperkinesias) of the facial and neighboring muscles. The author classifies the condition into cryptogenic and postparalytic hemifacial spasm and dwells at length on theories of origin. He concludes that hemifacial spasm is an organic disease and advances a hypothesis regarding the distribution of lesions within the nucleus of the facial nerve. There is an extensive bibliography. This volume will be of interest chiefly to neurologists.

—*Lt. Col. F. M. Townsend, U. S. A. F. (MC)*

Psychiatric Casualties Evacuated From Korea

Lionel A. Schwartz, *Captain, MC, U. S. A.* (1)

Eugene R. Inwood, *Colonel, MC, U. S. A.* (1)

THIS is a review of a group of psychiatric patients evacuated from Korea to this hospital. They were members of the United States Army and the United States Air Force stationed in Korea after the hostilities began. Their overt emotional illness and hospitalization began in Korea. All were evacuated initially to military hospitals in Japan and, following evaluation there, were returned to the United States because of emotional illness. They were admitted to this hospital before 25 June 1951 (the conclusion of the first year of military activity in Korea). These cases (60 in all) include all psychiatric admissions falling in the above category at this hospital as determined by: the mechanical coding system of the statistics and accounting division and admission reports of combat psychiatric cases submitted by psychiatric wards.

This group does not constitute a cross section of all Korean psychiatric casualties. Most such casualties were treated in Korea and Japan and returned to duty. Only those whose complete evaluation and treatment was expected to be prolonged (more than 120 days), and those whose prognosis was such that discharge from the service might become necessary were evacuated to the zone of the interior. Final disposition has been made on all patients included in this series. The sources of information for the material presented include clinical records and psychiatric social histories from varying sources.

RESULTS

The *rank* of the patients ranged from colonel to private. There were 11 officers and 49 enlisted men in this group (table 1).

Age. The average age was 25.2 years. The median age was 23 years. The oldest patient was 48, the youngest, 18.

Race. Eighty-eight percent (53 patients) were white, and 12 percent (7 patients) were Negroes.

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Branch of service. Sixty-eight percent (41 patients) were members of the Infantry. Next in frequency were medical aid men who constituted 7 percent (4 patients). The remaining 25 percent were divided among 8 other branches of the service (table 1).

TABLE 1. *Classification by rank and branch of service*

Rank	*Patients*	*Branch*	*Patients*
Colonel	1	Infantry	41
Lieutenant Colonel	1	Medical Service	4
Major	1	Engineers	3
Captain	1	Armored cavalry	3
First Lieutenant	4	Quartermaster Department	2
Second Lieutenant	3	Field Artillery	2
Sergeant	6	US Air Force (ground)	2
Corporal	15	Chaplain Corps	1
Private, first class	22	Adjutant General's Corps	1
Private	6	Military Police	1
Total	60	Total	60

Length of military service. This includes all military service regardless of branch of Armed Forces or whether service was continuous or not and includes military service up to the time of current hospitalization. The average was 5 4/12 years. The median was 3 9/12 years. The patient with the longest service had a total of 28 years; the patient with the shortest, 6 months.

Length of time of current overseas tour. Up to the time of hospitalization the average patient had been overseas 10.3 months. The range was from 21 days to 28 months.

Military experience during World War II. Forty-five percent (27 patients) had had military service in World War II. Thirty-eight percent (23 patients) had been in combat or had been stationed in combat areas in World War II.

Length of time in Korea. The average for all patients was 53.8 days. The median was 26 days. The range extended from 5 to 270 days. This includes time spent in Korea up to admission to the hospital.

Length of time in combat or front-line area. Seven patients were not in combat and were not in front-line areas. Of those who were in combat or front-line areas the average duration was 36.6 days. The median was 17 days. The range varied from 0 to 250 days.

Precipitating causes (table 2). The following precipitating factors were cited by the patients as stressful situations which rather closely preceded their "breakdown." Many patients reported more than one factor. The patients reporting that a shell or grenade had landed nearby

frequently added that they were knocked down by the concussion, rendered unconscious, or had some clothing torn away by the blast, but evidence of definite physical injury was absent in practically all of them.

Presenting symptoms are shown in table 3. The panicky patients ran about wildly with complete disregard for the safety of themselves or others.

TABLE 2. *Classification of precipitating causes*

Causes	*Patients*	*Percent*
Seeing buddy killed or wounded	20	43
Shell landed nearby	19	40
Wound or injury (not serious)	10	21
Member of unit which had suffered heavy losses, had been overrun, or found itself behind enemy lines	7	15
Enemy mass attack with threat of a "break through"	4	9
Many hours without sleep	3	5
Being forced to abandon a buddy	3	5
Returning to Korea after hospitalization in Japan for physical illness	3	5
Participating in withdrawal of his unit	2	3
Presence in Korea	2	3
Sending men under him on dangerous mission	1	2
First time under fire	1	2
Seeing results of enemy atrocities	1	2
Troops under his command performed poorly	1	2
Receiving "Dear John letter"* from U. S.	1	2
Frustration in job, lack of equipment, lack of cooperation	1	2
Projected night parachute jump	1	2

*Letter telling him his fiancée was married or in love with another man.

Factors in psychiatric social history. Examination of the marital status of these patients revealed that 31 percent were married, 5 percent divorced, and 64 percent had never been married. Seventeen percent had children. Examination of the number of siblings and/or half siblings revealed that the average patient came from a family consisting of 5 siblings. Eight percent of the patients were only children, 19 percent were the oldest, and 17 percent were the youngest sibling.

A review of the amount of formal education showed that 6 percent were college graduates, 10 percent had completed some college work, 10

percent were high school graduates, 37 percent had completed some high school work, and 37 percent terminated their education in grade school.

TABLE 3. *Classification of presenting symptoms*

Symptoms	*Patients*	*Percent*
Anxiety-fear symptoms: apprehension, worry, nervousness, mild confusion, irritability, tremulousness, palpitation, dyspnea	25	42
Psychosomatic symptoms: headache, dizziness, gastrointestinal symptoms, numbness, backache, chest pain	23	38
Depression: tearfulness, emotional lability	11	18
Conversion symptoms: hysterical paralysis or deafness	9	15
Helplessness: stupor, disorganization of personality	7	12
Panicky, maniacal, disoriented	6	10
Amnesia, blackouts	6	10
Hallucinations	4	7
Insomnia, nightmares, combat dreams	4	7
Paranoid trends, ideas of reference	3	5
"Froze up"	3	5
Suicidal attempts or self-injury	2	3
Overt hostility, belligerency	1	2

Incidence of predisposing factors (table 4). The psychiatric histories of these patients were reviewed in an attempt to determine the incidence of factors, both environmental and personal, which might be regarded as predisposing the patient to an emotional illness.

The degree of predisposition to emotional illness in these patients has been classified as marked, moderate, mild, and none. Patients whose histories revealed a definite psychiatric illness of such degree as to require hospitalization, intensive psychiatric treatment, or a complete change of environment were classed as having marked predisposition. One patient in this group presented evidence of bizarre thinking and a break with reality prior to arrival in Korea. Those with moderate predisposition included all whose histories revealed 3 or more definite predisposing factors of the type listed in table 4 and/or those who showed evidence of marked nervousness or poor socioeconomic adjustment as adults. Many had histories of disturbed and traumatic backgrounds during childhood and adolescence. Many showed repeated evidence of emotional immaturity and also marginal adjustments in the interpersonal sphere. Those with mild predisposition gave

histories of at least 2 predisposing factors, but none of a severe degree. Although some of these gave histories of poor childhood backgrounds, none had shown definite emotional symptoms as adults. Those with no predisposition gave histories of not more than 1 predisposing factor and that one not of a marked degree. None of these patients had shown any concrete evidence of psychiatric symptoms. This group also included patients whose histories were inadequate. In some instances the patient, and sometimes the families, were intentionally vague and evasive, but if there were no positive statements regarding predisposing factors, the patient was placed in the fourth group (table 5). Forty-four percent of the patients showed either marked or moderate predisposition and 74 percent showed some predisposition to emotional illness. The following are brief histories of patients in each of the first 3 categories.

TABLE 4. *Classification of predisposing factors*

Factor	*Patients*	*Percent*
Loss of one or both parents in childhood by separation, divorce, or death	24	40
Childhood neurotic traits: enuresis, nail biting, phobias, somnambulism, nightmares	15	25
Emotional illness of parent or sibling	13	22
Emotional illness in patient requiring psychiatric treatment prior to arrival in Korea	12	20
Poor occupational history and/or poor school adjustment	12	20
Alcoholism (moderate to heavy consumption)	9	15
Marked passive dependency	9	15
Marked nervousness or neurotic symptoms as adult (no psychiatric treatment)	8	13
Marked emotional immaturity	7	12
Unhappy marriage or threat of divorce	5	8
Antisocial behavior	5	8
Withdrawn, seclusive, day dreamer	4	7
Poor economic conditions in childhood	4	7
Criminal record of parent or sibling	3	5
Borderline mental defective	2	3
Reared in orphanage	2	3

Case 6. A 19-year-old man, the seventh of 9 siblings, reached the eighth grade at the age of 16. His occupations prior to service included those of carnival handyman and assistant electrician. He enlisted in the service at 18. The following significant factors are noted:

His mother kept him home from school "for no good reason" on many occasions. He was the subject of frequent whippings by his parents. According to a brother, the parents "picked on" the patient. There were constant quarrels between the parents. There was also a great deal of friction between the siblings. Economic circumstances were difficult. On several occasions the patient threatened to run away from home. Up to the time of his enlistment, he showed no evidence of nervousness. His predisposition was classified as mild. After 26 days of combat in Korea he became markedly upset on seeing another soldier "hacked up" with a knife by the enemy. A short time later, the patient was involved in an accident and was pinned under a truck. There was no definite evidence of physical injury. Soon thereafter he developed marked nervousness, headaches, vomiting, and nightmares which led to hospitalization.

TABLE 5. *Classification by degree of predisposition*

Degree	*Patients*	*Percent*
Marked	10	16.6
Moderate	16	26.7
Mild	18	30.0
None	16	26.7
Total	60	100.0

Case 3. An 18-year-old man, the youngest of 4 siblings, reached the ninth grade in school. His mother was described as a nervous person who was always in poor health. She was irritable and cried easily. His father was robust and feared by his children. One of the patient's brothers was serving a sentence in the penitentiary for a major crime. In school, the patient was described as a "wise guy" who frequently got into difficulty with the teachers. He was involved in several fights after enlisting in the Army at the age of 16. He was a moderately heavy drinker. Intelligence tests at the time of induction indicated low-grade normal intelligence. There was a history of enuresis until the age of 8. The patient had been a nail biter, had a fear of the dark, and a fear of closed quarters for as long as he could remember. His predisposition was classified as moderate. He was in combat for 5 days in Korea. He saw several of his buddies killed. Enemy mortar fire landed nearby. He became apprehensive, anxious, confused, preoccupied, and showed uncontrollable tremulousness. He was then hospitalized.

Case 37. A 34-year-old man was the second of 3 brothers. His mother died when he was very young. His father was committed to a mental institution when the patient was 4 years old and remained there until his death. The patient was reared by various relatives. He stated that he "never had the affection and security which most children have."

After a year in college, he entered the service in World War II. He was hospitalized for combat fatigue in 1944, discharged from the service in 1946, and in 1947 he was admitted to a Veterans Administration hospital for anxiety symptoms. He re-entered the service in 1948. In 1949 he was hospitalized on the neuropsychiatric service of an Army hospital. His predisposition was classified as marked. He spent about 7 days in combat in Korea. A number of men in his unit were lost. He found himself behind enemy lines and had to work his way back to his own lines. He became acutely apprehensive and tremulous, and a short time after arrival at the first hospital in Korea, he became disoriented and panicky.

TABLE 6. *Classification by original diagnosis*

Diagnosis	*Patients*
Anxiety reaction	27
Combat exhaustion	5
Psychiatric observation	4
Neurotic depressive reaction	3
Dissociative reaction	2
Conversion reaction	2
Latent schizophrenia	2
Psychogenic gastrointestinal reaction	2
Psychoses	2
Emotional instability reaction	2
Psychogenic musculoskeletal reaction	1
Inadequate personality	1
Manic-depressive reaction	1
Undetermined neurologic condition	1
Organic deafness	1
Peripheral vascular disease	1
Gastroenteritis	1
Not given	2
Total	60

Original diagnosis (table 6). Most of the diagnoses were made in Korea, but some were not recorded on the medical record until initial evaluation in Japan. A diagnosis of psychoneurosis was made in 72 percent (42 patients); of psychosis in 9 percent (5 patients); of psychiatric observation in 7 percent (4 patients); of organic disease which, during a subsequent hospitalization, was changed to a psychiatric diagnosis in 7 percent (4 patients); and of character and behavior disorders in 5 percent (3 patients).

Final diagnosis is shown in table 7. A final diagnosis of psychoneurosis was made in 57 percent (34 patients); of character and behavior disorders in 25 percent (15 patients); and of psychosis in 18 percent (11 patients). Two patients were found to have organic deafness in addition to their psychiatric illness.

TABLE 7. *Classification by final diagnosis*

Diagnosis	*Patients*
Anxiety reaction	19
Schizophrenic reaction Paranoid (8) Unclassified (2) Catatonic (1)	11
Inadequate personality	7
Conversion reaction	6
Neurotic depressive reaction	5
Emotional instability reaction	3
Psychogenic gastrointestinal reaction	2
Schizoid personality	2
Dissociative reaction	1
Alcoholic addiction	1
Combat exhaustion	1
Passive dependency reaction	1
Immaturity with symptomatic habit formation	1
Total	60

Duration of hospitalization. The term "total hospitalization" is used here to imply the total duration of hospitalization from the initial admission in Korea to the time of discharge from the hospital in the United States. This includes transportation and stopovers during medical evacuation. The term "hospitalization U. S." refers to the duration of hospitalization at this hospital. The average total hospitalization for the 57 patients whose final disposition was made at this hospital was 4.4 months (range 25 days to 10 months). The average hospitalization U. S. was 3.4 months (range 15 days to 9.5 months). Duration of hospitalization according to types of disposition revealed that for those patients returned to duty, the total hospitalization averaged 2.9 months and hospitalization U. S. averaged 1.9 months. For those who received medical discharges the average total hospitalization was 7.6 months and the average hospitalization U. S. was 6.5 months. The group transferred directly to a Veterans Administration hospital on discharge from this hospital had an average total hospitalization of 8.1 months and an average hospitalization U. S. of 7.5 months. For those patients who received administrative discharges the total hospitalization

averaged 5.5 months and the hospitalization U. S. averaged 4.9 months. For patients with psychoneurotic disorders the average total hospitalization was 4 months, and the average hospitalization U. S. was 3 months. For those with psychotic disorders the total hospitalization averaged 8.1 months and hospitalization U. S. averaged 7.1 months. For those with character and behavior disorders the average total hospitalization was 2.9 months and average hospitalization U. S. was 2 months.

Treatment at this hospital. On arrival at this hospital, the patients received various types of treatment according to their needs and the facilities available. Sixty-eight percent of the patients received, primarily, open-ward neuropsychiatric treatment. This consisted of periodic interviews with a psychiatrist and psychiatric social worker, group psychotherapy for some patients, occupational therapy, recreational therapy, some physical reconditioning, and living within the hospital environment which tended to be protective with only a minimal amount of restriction of activities. Most patients received convalescent leaves which enabled them to visit their homes. They also received overnight and week-end passes permitting them access to recreational and education facilities of the metropolitan area. Ten percent received, primarily, closed-ward neuropsychiatric treatment. These did not improve sufficiently during their hospitalization to allow their being placed on open wards. They received the advantages of most types of treatment for open-ward patients with the exception of convalescent leaves and passes. Twenty-two percent received both open- and closed-ward psychiatric treatment. Most of these improved sufficiently following initial admission to the closed ward so that they could be transferred to the open ward. A few open-ward patients developed exacerbation of symptoms necessitating their transfer to the closed ward. Ten percent received courses of electroshock therapy. Sodium amytal interviews were employed with only a few patients. Pharmacologic sedation and hydrotherapy were used as indicated. The evaluation of many patients was facilitated by the use of psychologic testing.

Twenty-eight percent (17 patients) showed marked improvement at the time of arrival or within 2 or 3 days. Twelve percent expressed a strong desire to be discharged from the Army. Some expressed marked resentment toward the Army and several showed an exacerbation of symptoms when they were about to be returned to duty. Eight percent (5 patients) were AWOL during part of their hospitalization.

Final dispositions. Three of the 60 patients in this series were transferred to another hospital for further psychiatric treatment This was an administrative move and not related to the condition of the patients. Of the 57 patients whose final disposition was made at this hospital, 37 (65 percent) were returned to active military duty in the continental United States; 17 (30 percent), received medical discharges

because of their psychiatric condition *(2)*; and 3 (5 percent) received administrative discharges from the military service because of character and behavior disorders which rendered them inadaptable to military service.

Disposition, according to diagnostic categories, revealed that 25 of 32 psychoneurotic patients and 12 of 15 patients with diagnoses of character and behavior disorders were returned to duty. All psychotic patients were medically separated from the service.

DISCUSSION

The fact that 65 percent of these patients were returned to duty would appear to be better than expected in view of the severity of symptoms of the patient selected for evacuation to the United States. This is particularly true because of the experience gained in World War II in the treatment of psychiatric combat casualties. It was learned then that early treatment accelerates rehabilitation *(3)*. On the other hand, it must be noted that all these rehabilitated patients were returned to duty in the United States and not to combat duty. It is possible that a number of this group would not have been selected for evacuation had there been adequate psychiatric facilities near the combat area. One-half of this entire group were initially hospitalized prior to 1 September 1950, that is, during the first 2 months of hostilities. The psychiatric facilities in the area have been enlarged and improved since that time. It is also noted that these patients became psychiatric casualties when the battle was going against them.

The fairly large group of patients (28 percent) who showed marked improvement on arrival at this hospital, or within a short time thereafter, gives further support to the popular theory of the basic conflict in combat psychiatric casualties. This theory states that there is a conflict between conscience, sense of duty, moral and social pressures on the one hand and the strong, perhaps instinctual, drive for self-preservation on the other *(4)*. This conflict can be resolved by the person being far removed from the combat area and at the same time being removed through medical channels which is a socially acceptable set of circumstances.

Another factor was the high incidence of predisposition to emotional illness shown by this group of patients. Almost half showed either a marked or moderate predisposition, while three-fourths showed some definite evidence of predisposition. These figures correspond closely to the estimates of Gillespie *(5)* in that between one-half and two-

(2) Of these, 11 were discharged to their own care; 5 were transferred to Veterans Administration hospitals for further treatment; and 1 was discharged to the care of his family.

(3) Hanson, F. R.: Combat psychiatry. Bull. U. S. Army M. Dept. 9: Supplemental Number, Nov. 1949.

(4) Miller, E.: The Neurosis in War. The Macmillan Co., New York, N. Y., 1943.

(5) Gillespie, R. D.: Psychological Effects of War on Citizen and Soldier. W. W. Norton & Co., Inc., New York, N. Y., 1942.

thirds of those who break down in service are predisposed. Ripley and Wolf *(6)* in their observations of neuropsychiatric patients in the Southwest Pacific during World War II also noted a high percentage of patients who gave histories of disturbed early environmental backgrounds and of emotional disorders in the families. This would seem to indicate the need for better psychiatric screening of combat soldiers, but there are a number of drawbacks to such a program. For one thing, it would be necessary to divide all personnel into combat and noncombat groups. When a sudden emergency arises, such as occurred in Korea, the immediate need for personnel is such that it would be difficult to abide by such a classification for soldiers. It might well prove a Herculean task in terms of medical personnel and work involved to try to develop an efficient psychiatric screening facility for all military personnel. This problem is seen prominently at induction centers. Another factor which must be considered is that of the selective service system. Only a limited pool of men is available to each draft board and from this they must fill their quota. Unless symptoms are pronounced, psychiatric defects are perhaps the easiest to overlook. One of the most difficult problems in the selection of soldiers is that many with poor family backgrounds, and even some with histories of civilian psychiatric disorders, are sometimes able to perform adequately in combat over prolonged periods *(3)*.

The precipitating factors, as well as the presenting symptoms in this series of patients, does not differ significantly from those found in other series of combat psychiatric casualties *(3,4)*. Another factor in the social histories of this group is the relatively large number of siblings of most of them. There was no unusual incidence of oldest or youngest siblings. One might speculate as to the possibilities of feelings of insecurity occurring in members of large families due to the necessary extensive sharing of emotional and material support from the parents.

SUMMARY

A review of the records of 60 psychiatric patients who had been evacuated from Korea to a general hospital in the United States revealed that 57 percent had psychoneurotic disorders; 25 percent had character and behavior disorders; and 18 percent were psychotic. Sixty-five percent were returned to duty in the continental United States; 30 percent were medically discharged; and 5 percent were administratively discharged. The average total duration of hospitalization from admission in Korea to discharge from the general hospital was 4.4 months. The average hospitalization period at the general hospital in the United States was 3.4 months.

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(6) Ripley, H. S., and Wolf, S.: Studies in psychopathology; data concerning adaptation to isolated situation of combat zone in Southwest Pacific. J. Nerv. & Ment. Dis. 114: 234-250, Sept. 1951.

An examination of the degree of predisposition to emotional illness in these patients revealed that 17 percent showed marked predisposition; 27 percent, moderate predisposition; 30 percent, mild predisposition; and 27 percent showed no definite predisposition.

The results indicate that the current methods of treatment have produced a high rate of patients returned to duty. The rate of 65 percent returned to duty even from a hospital far from the combat zone is much higher than in World War II. In part, this may be due to improved treatment and the benefit of experience gained in World War II in treating such patients, but now some of these patients undoubtedly would be held in Korea or Japan for treatment. Because the period covered by this study includes only the first year of the Korean conflict, it will be interesting to see whether the rate of return to duty remains as high now that more adequate treatment facilities and procedures are established in the Far East.

The 3 patients who were administratively discharged would not be evacuated under the procedure now being used. In the first days of the Korean conflict it was necessary to evacuate patients to the zone of the interior as the situation did not permit any other disposition.

EDITOR'S NOTE: The application of lessons learned during World War II has resulted in improved treatment to the extent that numbers found necessary to be evacuated to the zone of the interior as unfit for duty in the Far East Command since the onset of hostilities in Korea have been less than one-third of the number similarly evacuated from comparable theaters in World War II. The policy of definitive treatment has resulted in far fewer medical discharges for neuropsychiatric disorders. Medical separations are occurring at the rate of between 1 and 2 per thousand men per year as contrasted with rates of 24 in 1943 and of 16 in 1945. The current medical separation rate is less than one-half of the discharge rate ordinarily to be expected even in peacetime.

BOOKS RECEIVED

The Love and Fear of Flying, by *Douglas D. Bond,* M. D., Professor of Psychiatry and Department Head, Medical School, Western Reserve University. Preface by *General James H. Doolittle.* 190 pages. International Universities Press, Inc., New York, N. Y., publisher, 1952. Price $3.25.

Advances in Pediatrics, Volume V. Editor, *S. Z. Levine,* Cornell University Medical College, New York, Associate Editors, *Allan M. Butler,* Harvard Medical School, Boston, *Margaret Dann,* Cornell University Medical College, New York, *L. Emmett Holt, Jr.,* New York University College of Medicine, New York, and *A. Ashley Weech,* University of Cincinnati College of Medicine, Cincinnati. 273 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $7.

Special Pay for Medical and Dental Officers

George E. Armstrong, *Major General, U. S. A.* (1)

EFFORTS of the past few months to obtain an extension of Section 203, Public Law 351, 81st Congress (1949), which provided for special pay for medical and dental officers in the Armed Forces, have revealed the fact that many physicians and dentists currently drawing this pay are relatively uninformed as to the reasons for it. All too often those within service refer to the pay as a "bonus." Such references are incorrect and those who apply the misnomer are actually doing themselves and their professional colleagues a disservice.

A more understandable but equally erroneous concept is the one often voiced that the purpose of the special pay is to bring about a more favorable comparison between the compensation of the military medical or dental officer and that of his civilian colleagues. Although it cannot be denied that the practical effect of the measure is to eliminate some of this disparity, such was not the concern or basic justification for the special pay as it was conceived and originally provided for by Congress in 1947 in Public Law 365.

After extensive study and hearings, the justice and need for this special pay was determined by Congress in 1947. Both the monthly amount and basic justification of the bill were in terms of equalizing the pay of the service doctor with his brother officer. All arguments advanced in the interest of the passage of the bill at that time have an equal if not increased validity today. For example, on graduation a person pursuing a 4-year technical or scientific course leading to a baccalaureate degree in an accredited university meets the educational requirements for appointment as second lieutenant or ensign in the Armed Forces.

In contrast, a medical or dental student must finance a total college education of up to 8 years. In addition, all medical and some dental graduates spend a year in intern training, usually receiving only a

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token compensation. Their former classmates at college in the meantime have been receiving full pay and allowances as second and later as first lieutenants or as ensigns and then as lieutenants, junior grade. When the physician or dentist finally meets the requirements for a commission in the medical or dental corps of the several services, his former classmates have a 4-or 5-year lead. Because of the periodic increments in pay for longevity, 30 years after they started their respective careers the other categories of officers were formerly about $40,000 ahead of the medical or dental officers. Thus the basic objective of the special medical and dental pay of $100 per month was to wipe out an inequity within the service itself which existed prior to the passage of Public Law 365 in 1947 and to bring the total earnings of the service doctor over a 30-year period more nearly equal to those of the line officer.

BOOK REVIEW

Plastic Surgery of the Nose, Including Reconstruction of War Injuries and of Deformities from Neoplastic, Traumatic, Radiation, Congenital, and Other Causes, by *James Barrett Brown,* M. D., Professor of Clinical Surgery, Washington University School of Medicine, St. Louis, Mo.; Chief Consultant in Plastic Surgery, United States Veterans Administration, Washington, D. C.; Formerly Senior Consultant in Plastic Surgery, United States Army and in E. T. O., and Chief of Plastic Surgery, Valley Forge General Hospital, and *Frank McDowell,* M. D., Assistant Professor of Clinical Surgery, Washington University School of Medicine, St. Louis, Mo. 427 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $15.

This excellent monograph is well planned and concisely worded. The illustrations in 2 colors are superb. They are wisely chosen in that they illustrate those points in the text which are difficult to express in words. This results in very comprehensive descriptions of operative procedures. The first part of the monograph treats of preoperative planning, anatomic considerations, preparation of the patient, and indications for operation. Apropos of this latter, the authors emphasize the choosing of patients for rhinoplasty with an eye to their psychologic make-up. The latter half of the work is devoted to the surgical treatment of various deformities and conditions resulting from disease or injury, deformities resulting from cleft lip repair, and those following the treatment of malignant disease either by surgery or radiation.

—*Capt. L. E. Potter, MC, U. S. N.*

Hypertension and Unilateral Renal Disease[1]

James E. Doherty, *Captain, U. S. A. F. R. (MC)* (2)

Hugh P. Smith, *M. D.* (3)

SINCE the classic experiment of Goldblatt et al. (4) in the production of hypertension by partial ligature of the renal artery to one kidney, an enormous quantity of material regarding the association of renal disease and hypertension has accumulated in the literature. The problem of unilateral renal disease associated with hypertension was of great interest because one might deduce that following nephrectomy (if the kidney disease was responsible) the blood pressure might be permanently reduced. From 1934 through 1948, about 242 operations were reported in the literature (5) with only 47 fulfilling the criteria for significant and lasting fall in blood pressure. Many cases were reported with only a few months' follow-up, borderline blood pressure determinations, brief preoperative study and observation, and improper criteria for operation. Several authors (5-9) have attempted to establish criteria for operation which should assist in the selection of those patients who might be candidates for nephrectomy.

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(4) Goldblatt, H.; Lynch, J.; Hanzal, R. F.; and Summerville, W. W.: Studies on experimental hypertension; production of persistent elevation of systolic blood pressure by means of renal ischemia. J. Exper. Med. 59: 347-379, Mar. 1934.

(5) Smith, H. W. (New York): Hypertension and urologic disease. Am. J. Med. 4: 724-743, May 1948.

(6) Kilman, J. R.; Bradfield, E. O.; and Simpson, C. M.: Atrophic kidney and hypertension. J. Urol. 62: 417-425, Oct. 1949.

(7) Smith, H. W. (New York); Goldring, W.; and Chasis, H.: Role of kidney in genesis of hypertension. Bull. New York Acad. Med. 19: 449-460, July 1943.

(8) Goldring, W., and Chasis, H.: Sympathectomy and unilateral nephrectomy in treatment of hypertensive disease. M. Clin. North America 33: 751-771, May 1949.

(9) Abeshouse, B. S.: Hypertension and unilateral renal disease; review of literature and report of 16 cases. Surgery 10: 147-200, July 1941.

In the case presented below, the criteria of Abeshouse *(9)* were fulfilled. These included (1) an accurate history; (2) a thorough physical examination, including blood pressure determination and ophthalmoscopic examination; (3) an ECG; (4) a complete urinalysis; (5) blood chemistry determinations, a fractional phenolsulfonphthalein test, and special renal function tests; (6) roentgenographic studies including a film of the chest for heart size, a plain film of the genitourinary tract, intravenous urography, retrograde pyelography, and perirenal insufflation (not done on our patient); and (7) cystoscopic studies including careful inspection of the lower genitourinary tract, ureteral catheterization with collection of urine from each kidney for microscopic, chemical, and bacteriologic studies *(10)*, differential functional test (phthalein, indigo carmine), and bilateral retrograde pyelography *(11)*.

In addition to the above, a methacholine test *(12)* for pheochromocytoma was performed. This should be included in any evaluation of hypertension. Dibenamine and benzodioxane *(13)* have also been used for diagnosis in pheochromocytoma, but because of the false positive and false negative responses that have been reported *(14,15)*, the methacholine test is believed to be superior. A dose of 10 mg. is suggested rather than the 25 mg. reported here.

CASE REPORT

A 17-year-old married woman noted the onset of frontal headache, mild dyspnea, and edema of the hands and feet on or about 20 June 1948. She consulted a local physician who informed her that she had high blood pressure. He advised her to stop work (as a textile worker in a local mill) and prescribed sedation. Her symptoms continued and her blood pressure remained high in spite of this regimen. She was hospitalized for study. An examination at this time revealed uterine pregnancy at about 5 weeks' gestation. A therapeutic dilatation and curettage was performed on 6 August and the patient was discharged without complication several days later. She was seen again by the local physician on 19 August, at which time her symptoms were still unabated, and she was advised to have an operation for high

(10) Catheterization was performed only on the affected side in our patient as excellent function of the opposite kidney was determined previously.

(11) In our patient, this was performed only on the affected side as intravenous pyelography revealed satisfactory status of the opposite kidney.

(12) Guarneri, V., and Evans, J. A.: Pheochromocytoma; report of case, with new diagnostic test. Am. J. Med. 4: 806-813, June 1948.

(13) Aranow, H., Jr.: Symposium on cardiovascular diseases; differential diagnosis of pheochromocytoma. M. Clin. North America 34: 757-767, May 1950.

(14) Evans, J. A.; Rubitsky, H. J.; Bartels, C. C.; and Bartels, E. C.: Re-evaluation of reliability of pharmacologic and cold pressor studies in hypertension and pheochromocytoma. Am. J. Med. 11: 448-467, Oct. 1951.

(15) Conley, J. E., and Junkerman, C. L.: Lack of specificity of piperoxan hydrochloride test for adrenal medullary tumors. J. A. M. A. 147: 921-923, Nov. 3, 1951.

Figure 1. Intravenous pyelogram 15 minutes after injection of the dye showing a well visualized left kidney with normal contour. The right kidney was not visualized. Dye is present in the bladder. Figure 2. Retrograde pyelogram following injection of dye into right ureter showing blunting of all calyces, particularly those of the upper pole.

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blood pressure. On 21 August she was admitted to this hospital at which time she gave a history of a genitourinary infection in the spring of 1947.

On admission she did not appear acutely ill. Her temperature was 99.2° F. Her pulse was 72. Her respirations were 18. Her blood pressure (reclining) was 198/140-130, (sitting) 180/140, and (standing) 165/142. Her height was 65 inches. Her weight was 118 lb. The ophthalmoscopic examination was negative. Her lungs were clear. Her heart was not enlarged and the heart sounds were of good quality. No murmurs were heard. Her abdomen was negative. The pelvic examination revealed a slight discharge and tenderness of the body of the uterus. The neurologic examination was negative.

The urinalysis revealed 8 leukocytes per high power field (centrifuged). The leukocyte count was 5,800 with 1 percent basophils, 7 percent eosinophils, 20 percent stab cells, 50 percent polymorphocytes, 20 percent lymphocytes, and 2 percent monocytes. The intravenous pyelogram (fig. 1) revealed little or no dye in the right kidney. The left kidney appeared larger than normal and the dye was present in good concentration. A retrograde pyelogram of the right side only (fig. 2) revealed blunting of all the calyces, particularly those of the upper pole. This appeared to be a small anomalous kidney. At the time of catheterization of the right ureter, no urine could be obtained and indigo carmine dye failed to appear within 10 minutes. An amytal

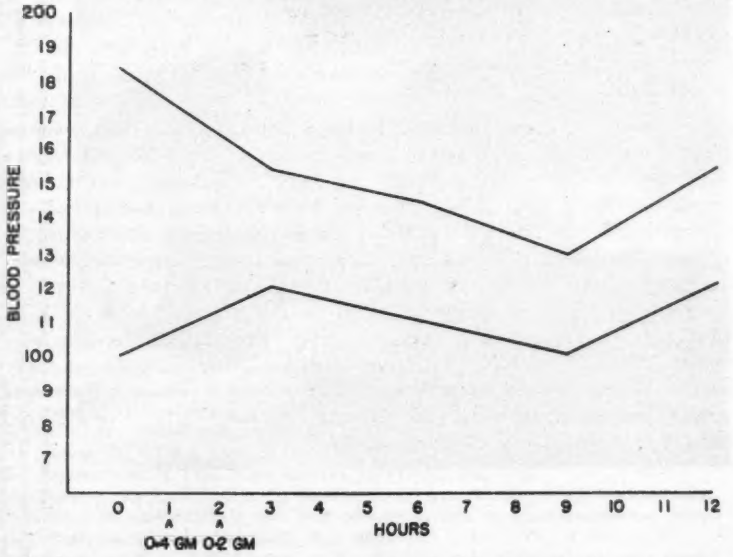

Figure 3. Amytal sedation test following 0.6 gram of amytal given orally. Note failure of diastolic pressure to fall significantly.

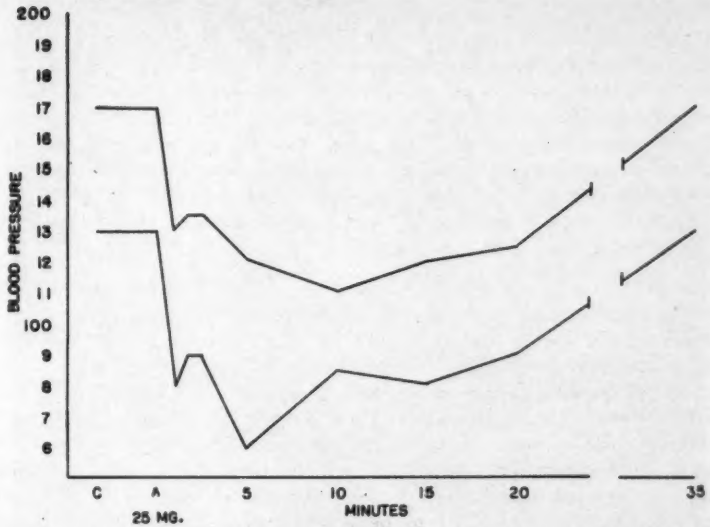

Figure 4. Methacholine test following 25 mg. of methacholine injected subcutaneously after control period.

sedation test was performed (fig. 3) without significant lowering of the diastolic pressure. A methacholine test for pheochromocytoma was performed with negative results (fig. 4). All other findings were within normal limits.

In view of the above findings, a right nephrectomy was performed on 1 September 1948 under general anesthesia. A small fibrotic kidney was removed. It weighed 24 grams and measured 5.8 by 2.2 cm. Microscopic sections (fig. 5) of the right kidney showed atrophy of the parenchyma. The tubules were dilated and contained acidophilic or amphophilic casts. There was an increase in stroma which was heavily infiltrated with lymphocytes and plasma cells. An occasional glomerulus was encountered in these areas which showed no remarkable changes. Throughout the sections there were small arteries and arterioles with markedly thickened walls. These changes were regarded as atrophic in nature and probably due to disuse. The renal pelvis showed nonspecific inflammatory changes. Based on the microscopic appearance, a diagnosis of severe chronic pyelonephritis was made.

The patient's postoperative course was uneventful and on 24 September, when discharged from the hospital, her blood pressure was 135/95. In December she missed a menstrual period and several weeks later the diagnosis of uterine pregnancy was confirmed. The blood pressure was 130/80 and urinalysis was negative at that time.

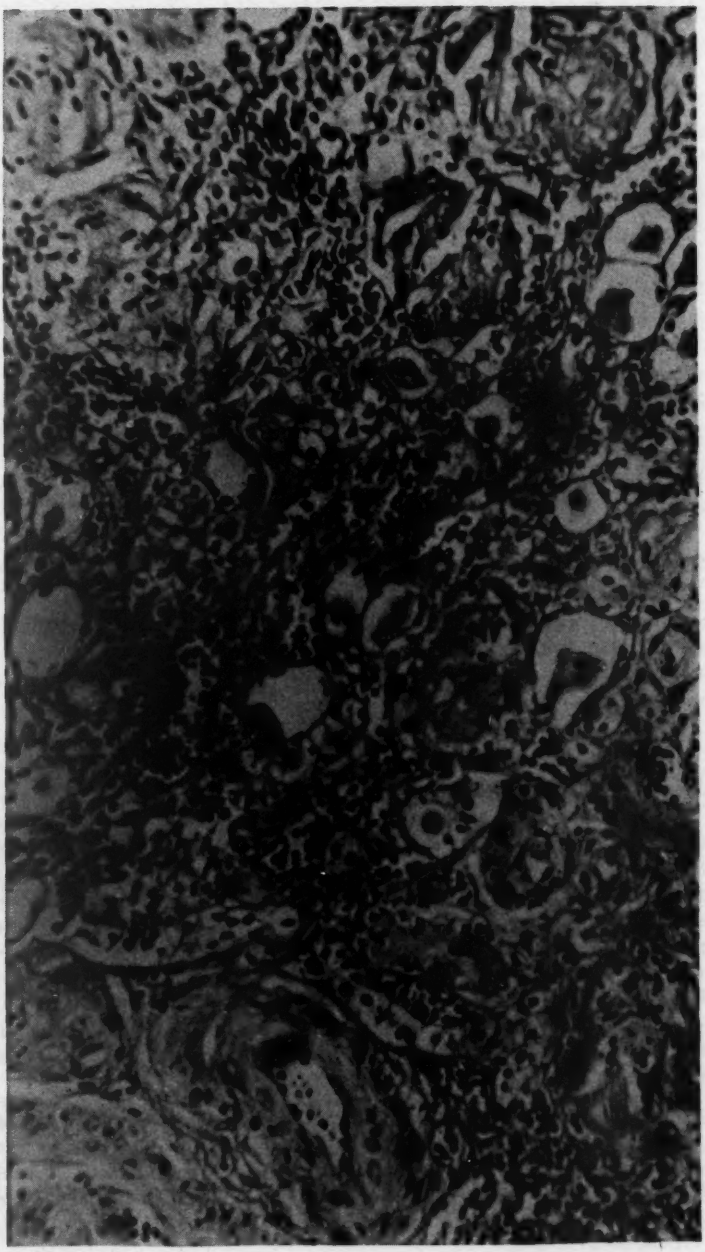

Figure 5. Microscopic section of right kidney.

The prenatal course was followed closely and was normal except for 1 to 3 plus albumin in the urine which responded to treatment for early toxemia. On 19 September 1949 her blood pressure had risen to 142/98 and as she was near term, labor was induced by rupture of the membranes. Delivery was uneventful and her blood pressure did not exceed 140/90 while she was in the hospital. The urine at the time of delivery was negative for albumin. She was seen for a postpartum checkup on 1 October at which time her blood pressure was 160/104 and again 10 October when it was 142/86. No albumin was present in the urine.

On 5 November she was seen by one of us (H. S.) and her blood pressure was 164/112. Her urine was negative for albumin. She was again given contraceptive instruction, but in spite of this, reported on 28 January 1950 that she had missed one menstrual period. Her weight was 147 lb., her blood pressure was 160/100, and her urine was negative for albumin. During the remainder of this pregnancy her blood pressure fluctuated from 110/78 to 146/90 and her urine showed albumin much as reported in the previous pregnancy. On 23 August she spontaneously delivered a live infant. Following delivery her blood pressure fell to 130/80 and the urinalysis was reported as negative. She was not seen by a physician again until 17 August 1951 when she reported to her local physician complaining of severe headache, nausea, and vomiting. Her blood pressure at this time was 150/100 and her urine showed a trace of albumin and too many leukocytes to count. She failed to respond to treatment and was hospitalized on 25 August, at which time her blood pressure was 160/100 and her urine showed a trace of albumin, from 10 to 15 leukocytes and from 2 to 5 erythrocytes per high power field. On 27 August her blood pressure was 138/90. She was symptomatically improved and was discharged from the hospital. Subsequent visits to her local physician have revealed blood pressure determinations from 150/110 to 160/120. At the time of the last visit to her physician her urine was negative for albumin.

COMMENT

At the time this patient was first seen, an elevated blood pressure had been known to be present for 2 months. It is not known how long before she was seen by a physician this elevation had existed, but a more or less constant rise in blood pressure was noted over a 6-week period of observation prior to operation. The patient was aborted at 6 weeks' gestation with a presumptive diagnosis of toxemia of pregnancy prior to removal of the diseased kidney, but as this procedure failed to reduce her blood pressure, it probably had no bearing on the final outcome. The intervention of two pregnancies during the follow-up period (both of which occurred against medical advice) would seem to support this conclusion. In a thorough search of the literature, no patient could be found in whom the remaining kidney was subjected to the burden of two pregnancies within a 2-year period following opera-

tion. Few patients were found with such a definite and prolonged fall in blood pressure during the 2 years following nephrectomy. The recurrence of symptoms and hypertension at 2 11/12 years following nephrectomy serves to illustrate the fact that prolonged and careful follow-up is necessary with patients of this type before the results can be evaluated.

SUMMARY

Following nephrectomy a woman with unilateral chronic pyelonephritis became normotensive and delivered 2 full-term infants without significant difficulty during a 2-year period. About 3 years after operation her symptoms and hypertension returned. Claims for cure of hypertensive disease after removal of a single diseased kidney should be made only after prolonged follow-up and careful evaluation.

BOOK REVIEW

The Metabolic Response to Surgery, by *Francis D. Moore,* M. D., Moseley Professor of Surgery, Harvard Medical School, Surgeon-in-Chief, Peter Bent Brigham Hospital, Boston, Mass., and *Margaret R. Ball,* A. B., Department of Surgery, Harvard Medical School, Laboratory for Surgical Research, Peter Bent Brigham Hospital, Boston, Mass. Metabolic diagrams by *Mildred B. Codding,* A. B., M. A., Surgical Artist, Department of Surgery, Harvard Medical School, Peter Bent Brigham Hospital, Boston, Mass. American Lecture Series Publication No. 132, A Monograph in American Lectures in Surgery. 156 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $7.50.

For those who have only a partial knowledge of this subject and for those who have been confused by the perplexity of formulas and theories on the water and electrolyte changes during operations, this book gives a valuable description of patients operated on in whom careful studies have been made relative to body temperature, caloric intake, nitrogen balance, potassium and sodium levels in the blood, and in some instances responses to ACTH and cortisone. Reading this book is like making rounds on patients on the ward. The cases are arranged to guide the reader from "the response to a single trauma" to "complex problems in metabolic response." This is followed by examples of how this metabolic response is changed clinically by forced feedings, et cetera. The appendix contains a list of diets for tube feeding surgical patients and brings out the fine points in parenteral nutrition. The book is a comprehensive review of the many lectures and postgraduate symposiums delivered by the senior author in recent years and is a practical guide to the surgeon, giving him a more accurate quantitative concept of the chemical changes experienced by his patients.

—Maj. G. Alvary, U. S. A. F. (MC)

The Military Importance of Viral Hepatitis[1]

W. Paul Havens, Jr., M. D. (2)

THE importance of epidemic jaundice as a disease frequently associated with the operations of various armies in different parts of the world was recognized during the eighteenth and nineteenth centuries (3). The experience of World War I was no exception, and during World War II this disease, under the name of viral hepatitis, was an important cause of loss of time in Allied and Axis Forces (table 1). Since then, a high endemic rate of hepatitis has been present in the U. S. Army of Occupation in Germany (4) and, more recently, it has again been present in our troops in Korea (5). The impact of this disease on military effectiveness during the past decade was sufficient to stimulate numerous investigations here and abroad and, as a result, much new information became available on the clinical course of the disease and its causative agents, possible manners of transmission, and prevention. Hepatitis is believed to exist as a naturally occurring disease ordinarily termed *infectious hepatitis* (IH) and also in an artificially transmitted form commonly known as *homologous serum hepatitis* (SH). At least 2 distinct viruses or strains of virus have been associated with these 2 forms of disease. Certain of the similarities and differences between them and their causative agents are summarized in table 2. Much of this information was derived from the use of volunteers. Although numerous failures to transmit

(1) Presented 18 October 1951 at the Surgeon General's Monthly Medical Meeting, Washington, D. C. This investigation was conducted under the sponsorship of the Commission on Virus and Rickettsial Diseases and the Commission on Liver Diseases, Armed Forces Epidemiological Board, and supported, in part, by the Office of The Surgeon General, Department of the Army, Washington, D. C.

(2) From the Jefferson Medical College, Philadelphia, Pa.

(3) Gardner, H. T.: Symposium on viral hepatitis; note on history of epidemic viral hepatitis in Germany. Am. J. Med. 8: 561-564, May 1950.

(4) Paul, J. R., and Gardner, H. T.: Symposium on viral hepatitis; endemiologic aspects of hepatitis in U. S. troops in Germany, 1946-1950. Am. J. Med. 8: 565-580, May 1950.

(5) Havens, W. P., Jr.: Report of trip to Japan and Korea during period 14 March - 11 April 1951 to study viral hepatitis among American troops in these countries. Submitted to The Surgeon General, U. S. Army, 25 April 1951.

either form of hepatitis to many species of laboratory animals have been recorded (6), renewed vigor in this line of research was initiated by the reports of Henle et al. (7, 8) of the propagation of IH and SH virus in tissue culture and/or embryonated eggs. From the former was developed an irradiated allantoic fluid antigen which produced positive skin tests in a large percentage of patients known to have had IH (9). More recently, Jordan and Mirick (10) described a transmissible form of hepatitis in mice inoculated with materials from a fatal human case of the disease. The relationship of the disease in mice to hepatitis in man is not yet clear.

TABLE 1. *Admissions to U. S. Army hospitals for viral hepatitis**

Year	United States	Overseas	Total Army
1942	33,466	15,645	49,111
1943	3,807	23,626	27,433
1944	3,116	21,901	25,017
1945	6,120	70,475	76,595
1946	3,787	5,480	9,267
1947	1,400	2,717	4,117
1948	1,069	2,463	3,532

*Preliminary data furnished by the Medical Statistics Division, Office of The Surgeon General, Department of the Army, December 1949. The number of cases in the United States in 1942 reflects largely the experience with homologous serum hepatitis, while the great increase in cases in 1945 overseas largely reflects the experience with infectious hepatitis in the Mediterranean theater.

It is the purpose of this article to discuss certain aspects of IH and SH with particular regard to their military importance.

INFECTIOUS HEPATITIS

Epidemiology. IH probably exists throughout the world and it is doubtlessly endemic in many regions where it has not had clinical recognition. A sharp increase in prevalence commonly occurs in the late autumn and it often assumes epidemic proportions in the early winter

(6) Colbert, J. W., Jr.: Review of animal experimentation in infectious hepatitis and in serum hepatitis. Yale J. Biol. & Med. 21: 335-343, Mar. 1949.

(7) Henle, W.; Harris, S.; Henle, G.; Harris, T. N.; Drake, M. E.; Mangold, F.; and Stokes, J., Jr.: Studies on agent of infectious hepatitis; propagation of agent in tissue culture and in embryonated hen's egg. J. Exper. Med. 92: 271-281, Sept. 1950.

(8) Henle, W.; Drake, M. E.; Henle, G.; and Stokes, J., Jr.: Evidence for propagation of virus of serum hepatitis in chick embryo. Archiv für die gesamte Virusforschung. To be published.

(9) Henle, G.; Drake, M. E.; Henle, W.; and Stokes, J., Jr.: Skin test for infectious hepatitis. Proc. Soc. Exper. Biol. & Med. 73: 603-605, Apr. 1950.

(10) Jordan, J., and Mirick, G. S.: Hepatitis in mice, of presumed viral origin; preliminary report. Bull. Johns Hopkins Hosp. 89: 328-331, Oct. 1951.

and declines in the spring. Deflection from this pattern is always a matter of interest and attention has been called (4) to the experience of American troops with viral hepatitis in Germany. Following the severe outbreak in the winter of 1945, the seasonal variation of occurrence was less pronounced although the incidence of disease steadily increased until 1948, after which it declined somewhat. Cases were widely scattered and localized outbreaks were uncommon although certain areas had consistently a greater morbidity. There is no ade-

TABLE 2. *Comparison of infectious hepatitis and homologous serum hepatitis**

	Infectious hepatitis	Homologous serum hepatitis
Clinical		
Incubation period	15 to 30 days	60 to 120 days
Type of onset	Sudden	Insidious
Epidemiologic		
Contact cases	Common	Rare
Seasonal incidence	Fall-winter	Throughout year
Virus		
Filtrable	Seitz EK	Seitz EK
Resistance to heat	56° C. 30 minutes	56° C. 60 minutes
Susceptible host	Man	Man
Route of infection (experimental)	Parenteral or oral inoculation	Parenteral inoculation
Virus in stool	Acute phase	Not demonstrated
Virus in serum	Acute phase	Incubation period and acute phase
Immunity		
Homologous	Present	Present
Heterologous	None apparent	None apparent
Prophylactic value of human gamma globulin	Good	Equivocal

*Havens, W. P., Jr.: Viral hepatitis—progress and problems. Pennsylvania M. J. 52: 1653-1657, Dec. 1949.

quate explanation for this situation. Undoubtedly, a great opportunity for transmitting virus accidentally by improperly sterilized needles or syringes exists in any area where hepatitis is widespread. The possibility of this has raised the question as to whether a certain amount of the hepatitis in the U. S. Army of Occupation in Germany may have been artificially transmitted in the course of vaccinations or therapy, thereby offering a partial explanation of the lessened seasonal variation in the incidence. The reasons for the high incidence of hepatitis among our troops occupying Germany are not defined. The endemic rate of hepatitis among civilians in Bavaria, which is in the U. S. Zone, has long been high (4). The repeated introduction of susceptible

replacements and the increased fraternization between Americans and Germans, possibly under conditions favorable to transmission of the disease, may be contributing factors.

The exact ways in which IH spreads naturally are not yet thoroughly known, although it is generally believed that the intestinal-oral circuit is one of the important routes of transmission and personal contact is a common medium of exchange. It has been repeatedly observed in

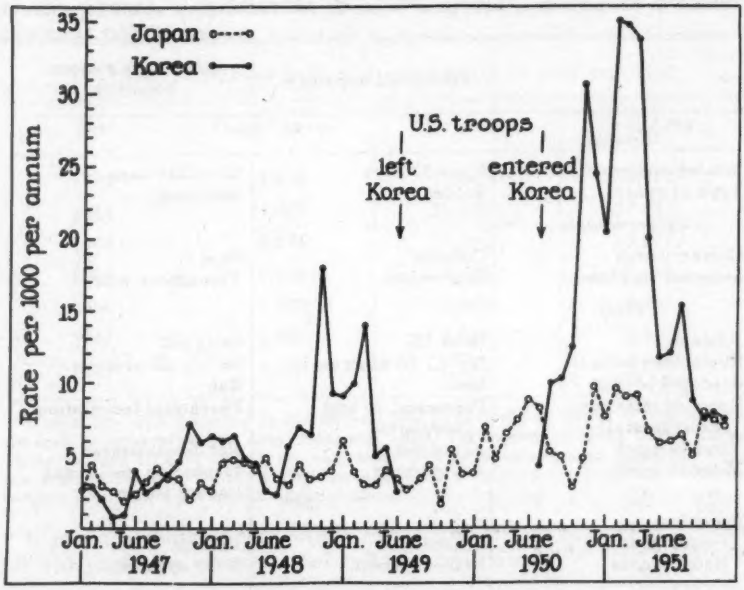

Figure 1. Incidence of viral hepatitis in United States personnel in Japan and Korea. (Preliminary rates furnished by the Medical Statistics Division, Office of The Surgeon General, Department of the Army, 21 November 1951. Air Force personnel are included through June 1949. Cases of viral hepatitis include serum hepatitis until May 1951, after which an effort was made to omit cases of serum hepatitis from the data; such cases constitute only a small percent of the total.)

military groups that the disease may become prevalent when and where camp sanitation is poor and more particularly during combat. It was not unusual, then, that a sharp increase in incidence of hepatitis occurred in our troops several months after they returned to Korea in June 1950 (fig. 1). During the first 5 months of the campaign, there was little hepatitis and it was diffusely spread as the troops moved northward, but in November the disease spread rapidly and, following the retreat in December and the massing of forces below the thirty-eighth parallel, the incidence of hepatitis was greatly augmented in the area of troop concentration. In the following autumn when military

activities were far less intense, the incidence of hepatitis was greatly diminished as compared with the previous winter when the campaign was active. In general, the pattern of spread of disease in 1950-1951 in Korea is reminiscent of the experience of troops in North Africa and the Western Desert, Sicily and Italy during 1943-1945 *(11)*, and in Germany in 1944-1945 *(4)*. Although a great potential for artificial transmission by way of contaminated syringes or needles existed in Korea, the clinical course of disease with its sudden onset, in addition to its seasonal incidence, suggests that this was not an important way of spread. It would seem far more likely that this experience with hepatitis was the result of the introduction of susceptible young adults into an area where virus was widespread and where certain of the conditions favorable for natural transmission were fulfilled.

Control measures. The control of outbreaks depends, in part, on the interruption of the intestinal-oral route of spread. Unfortunately, there is no reliable way to detect healthy human carriers. Subclinical cases or carriers may be suspected if certain tests of hepatic function are found to be abnormal, although the complexity of most of these makes them unsuitable for mass screening tests. The determination of bilirubinuria, however, is a simple and reliable test which becomes positive early before clinical jaundice is evident *(12)* and is recommended as a valuable aid in diagnosis in the preicteric or anicteric phase. It is not known how long virus remains in the blood or feces of infected persons, but recent observations by Capps et al. *(13)* have indicated that in infants, at least, the fecal-carrier state may persist for as long as 16 months and be a source of infection.

Particular effort should be made to rinse, clean, and sterilize with heat (boiling or autoclaving for 15 minutes) all needles and syringes or instruments which come in contact with blood of patients with hepatitis in order to prevent artificial transfer of virus.

Normal human gamma globulin is of value prophylactically if given up to within 6 days before the onset of disease. Earlier investigations suggested a dosage of from 0.06 to 0.12 cc. per pound of body weight *(14, 15)* and more recent observations indicated that as little as 0.01 cc.

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(11) Gauld, R. L.: Epidemiological field studies of infectious hepatitis in Mediterranean Theatre of Operations; clinical syndrome, morbidity, mortality, seasonal incidence. Am. J. Hyg. 43: 248-254, May 1946.

(12) Swift, W. E., Jr.; Miller, W. N.; Streitfeld, F. H.; and Knowlton, M.: Symposium on viral hepatitis; evaluation of 2 screening tests for detection of early and sub-icteric viral hepatitis. Am. J. Med. 8: 581-583, May 1950.

(13) Capps, R. B.; Bennett, A. M.; and Stokes, J., Jr.: Endemic infectious hepatitis in an infants' orphanage; epidemiologic studies in student nurses. Arch. Int. Med. 89: 6-23, Jan. 1952.

(14) Stokes, J., Jr., and Neefe, J. R.: Prevention and attenuation of infectious hepatitis by gamma globulin; preliminary note. J. A. M. A. 127: 144-145, Jan. 20, 1945.

(15) Havens, W. P., Jr., and Paul, J. R.: Prevention of infectious hepatitis with gamma globulin. J. A. M. A. 129: 270-272, Sept. 22, 1945.

per pound of body weight might be sufficient (16), although the latter dosage has not always been effective (17). The duration of passive protection is undetermined, but recent observations suggested that continued heavy exposure to virus under natural conditions following the inoculation of gamma globulin may result in an active immunity superimposed on the passive protection (16).

Clinical findings. In the variable clinical course of IH, jaundice may be absent, transient, or may persist for several weeks. Two phases of disease are frequently evident: the preicteric phase ushered in by chilliness, fever, anorexia, nausea, and vomiting, followed by an icteric phase. The onset may, however, be so insidious that the first abnormality noted is jaundice. Icterus usually reaches its peak in 2 weeks and is ordinarily gone in 6 weeks, although wide differences in severity of disease are evident not only in individuals but in outbreaks. Relapse is uncommon and may manifest itself only by recurrent abnormality of tests of hepatic function or as a duplication of the icteric phase of disease. Eventual complete recovery occurs in most patients.

Because of the large number of troops who have had hepatitis, it has been of particular importance to determine how often chronic hepatic disease occurs. The evidence indicates that only a small percent of patients have prolonged hepatic dysfunction. A large portion of this group is asymptomatic and chronic or recurrent hyperbilirubinemia with abnormal retention of intravenously administered bromsulphalein is the most reliable manifestation of hepatic insufficiency. The functional impairment of the liver and the clinical condition are apparently compatible with full activity and eventual complete recovery in many of these patients. Anorexia, lassitude, and epigastric discomfort, with hepatomegaly and splenomegaly, are present in a smaller group of patients. Clinical jaundice need not be present and the most common evidence of hepatic dysfunction in such patients is the abnormal retention of intravenously administered bromsulphalein. Prolonged therapy is usually followed by improvement, although a small percent of such patients develop cirrhosis with a poor ultimate prognosis.

Although inadequate therapy, intercurrent infections, previous hepatic disease or debilitation, premature indulgence in alcohol, and older age are commonly cited as predisposing conditions to the development of chronic hepatitis, most of the young adults with this condition fail to reveal any factors in their history which can be defined with certainty as having contributed to the continued hepatic disease. It is not yet known whether the continued presence and activity of virus in the body cause relapse or chronic hepatitis, or if such occurrences merely repre-

(16) Stokes, J., Jr.; Farquhar, J. A.; Drake, M. E.; Capps, R. B.; Ward, C. S., Jr.; and Kitts, A. W.: Infectious hepatitis; length of protection by immune serum globulin (gamma globulin) during epidemics. J. A. M. A. 147: 714-719, Oct. 20, 1951.

(17) Kaufmann, G. G.; Sborov, V. M.; and Havens, W. P., Jr.: Outbreak of infectious hepatitis—presumably food-borne. To be published.

sent the progressive functional inadequacy of the liver damaged by the initial infection.

Treatment. The 2 most important therapeutic principles are the provision of adequate rest in bed and a well-balanced, palatable, nutritious diet. To accomplish the latter, the use of cream, milk, butter, and eggs is desirable. How long patients should remain in bed or off duty has come to be a controversial subject and it is of interest to compare the length of time spent in hospitals, convalescent centers, and on sick leave by our troops with this disease in various areas during the past 10 years (table 3). Because the average severity of disease and incidence of chronic hepatitis have apparently not altered appreciably, the great increase in amount of ineffective time from 30 days in 1943 to 90 days in 1951 suggests that the criteria for recovery

TABLE 3. *Average number of days spent by certain groups of U. S. troops in hospitals, in convalescent centers, or on sick leave for acute hepatitis**

1943-1944	1943-1945	1947-1949	1950-1951	
Egypt	Mediterranean	Germany	Japan	Germany
30	49	60	87	90

*Summarized from reports of Havens, W. P., Jr. (5, 18); Barker, M. H., et al. (19); Swift, W. E., Jr., et al. (20); and Paul, J. R. (21).

are not clearly defined and that the progressive increase in period of convalescence is based, in part, on fear of relapse or chronic disease rather than on an actual awareness of therapeutic necessities. This confusion is partly a heritage from experience during World War II which indicated that too early ambulation of physically depleted patients with this disease was not infrequently followed by relapse (22). In contrast, subsequent experience with the U. S. Army of Occupation troops in Germany who were in good physical condition before contracting the disease suggested that convalescence was not prolonged nor the rate of relapse increased if patients were allowed to have much more exercise than was previously considered compatible with recovery

(18) Havens, W. P., Jr.: Infectious hepatitis in Middle East; clinical review of 200 cases seen in military hospital. J. A. M. A. 126: 17-23, Sept. 2, 1944; Correction 126: 782, Nov. 18, 1944.

(19) Barker, M. H.; Capps, R. B.; and Allen, F. W.: Acute infectious hepatitis in Mediterranean theater, including acute hepatitis without jaundice. J. A. M. A. 128: 997-1003, Aug. 4, 1945.

(20) Swift, W. E., Jr.; Gardner, H. T.; Moore, D. J.; Streitfeld, F. H.; and Havens, W. P., Jr.: Symposium on viral hepatitis; clinical course of viral hepatitis and effect of exercise during convalescence. Am. J. Med. 8: 614-622, May 1950.

(21) Paul, J. R.: Report on hepatitis in EUCOM (1947-51). Epidemiologic and experimental investigations currently in progress at the Laboratory of the 98th General Hospital, Munich. Submitted to The Surgeon General, U. S. Army, 24 September 1951.

(22) Barker, M. H.; Capps, R. B.; and Allen, F. W.: Chronic hepatitis in Mediterranean theater; new clinical syndrome. J. A. M. A. 129: 653-659, Nov. 3, 1945.

(20). The need for determining the least amount of hospitalization required to return the greatest number of men to duty with the lowest incidence of relapse or chronic hepatitis is evident. It would seem likely that some compromise between the extremes already practiced might be effective.

Therapeutic trials of ACTH (23, 24) and aureomycin (25, 26) in the acute phase of viral hepatitis have been made. Administration of the former was followed by a sharp diminution in the amount of serum bilirubin, although "mooning" of the face, ascites, edema, and hypertension were frequently observed and relapse following the cessation of too short a course of therapy was common (27). The significance of the decline in bilirubinemia is not clearly enough understood to warrant its general use. The oral and intravenous administration of aureomycin to certain patients seriously ill or in hepatic coma is of apparent value, although it has no evident beneficial effect on the average patient with viral hepatitis.

In the treatment of chronic hepatic disease in many patients with persistent, mild functional hepatic disability, the clinical condition is frequently compatible with full activity. A smaller group of patients with anorexia, epigastric discomfort (with or without jaundice), and an enlarged, tender liver, requires rest in bed for prolonged periods with special attention to a well-balanced, nutritious diet. The treatment of a small number of such patients with from 250 to 500 mg. of aureomycin or terramycin every 6 hours by mouth over a period of 1 or 2 months has been reported to be beneficial although additional investigation is required before this may be recommended generally (28, 29). In those patients with postnecrotic cirrhosis, the usual therapeutic regimen employed for persons with Laennec's cirrhosis is recommended and the intravenous administration of salt-poor albumin appears to be of value on occasion.

HOMOLOGOUS SERUM HEPATITIS

The course of SH is clinically indistinguishable from that of IH with the exception of its onset which is more apt to be insidious and accom-

(23) Colbert, J. W., Jr.; Holland, J. F.; Heissler, L.; and Knowlton, M.: Use of ACTH in acute viral hepatitis. In Mote, J. R. (editor): Proceedings of the Second Clinical ACTH Conference, Vol. I. Blakiston Co., Philadelphia, Pa., 1951. pp. 371-385.

(24) Sborov, V. M.: Discussion. In Mote, J. R. (editor): Proceedings of the Second Clinical ACTH Conference, Vol. I. Blakiston Co., Philadelphia, Pa., 1951. pp. 381-384.

(25) Shaffer, J. M.; Farquhar, J. D.; Stokes, J., Jr.; and Sborov, V. M.: Studies on use of aureomycin in hepatic disease; aureomycin therapy in acute viral hepatitis. Am. J. M. Sc. 220: 1-5, July 1950.

(26) Farquhar, J. D.; Stokes, J., Jr.; Whitlock, C. M., Jr.; Bluemle, L. W., Jr.; and Gambescia, J. M.: Studies on use of aureomycin in hepatic disease; note on aureomycin therapy in hepatic coma. Am. J. M. Sc. 220: 166-172, Aug. 1950.

(27) Evans, A. S.: Personal communication.

(28) Shaffer, J. M.; Bluemle, L. W., Jr.; Sborov, V. M.; and Neefe, J. R.: Studies on use of aureomycin in hepatic disease; aureomycin therapy in chronic liver disease, with note on dermal sensitivity. Am. J. M. Sc. 220: 173-182, Aug. 1950.

(29) Sborov, V. M., and Sutherland, D. A.: Fatty liver following aureomycin and terramycin therapy in chronic hepatic disease. Gastroenterology 18: 598-605, Aug. 1951.

panied by less fever. In addition, the mortality rate may be much higher and this has been thought to be related to the poor physical condition of many of the patients who contract the disease. The widespread use of transfusions of plasma and blood, particularly in depleted patients, has augmented the dangers of artificial transmission of disease, and the seriousness of this problem has recently been re-emphasized by the high incidence of SH in battle casualties who received plasma and, to a lesser degree, blood in Korea and Japan.

Prevention and control. The lack of specific serologic tests and susceptible laboratory animals, as well as ignorance about the length of time that persons carry the virus, makes control difficult. Carriers of virus may reveal evidence of hepatic dysfunction, if tested, but the fact that asymptomatic donors, with normal tests of hepatic function, have also been proved to be carriers makes this an unreliable method of detection. Although it is not known how long the carrier state may last, evidence is accumulating to suggest that it is well equilibrated under certain circumstances and exists more frequently and for a longer period than previously suspected. The prolonged period of viremia in experimentally infected volunteers who were asymptomatic and without evidence of hepatic dysfunction supports this concept and suggests that in the biologic economy of hepatitis virus a close relationship with man may exist. In this regard, it is of interest that a donor whose blood had apparently produced hepatitis with long incubation periods in 2 different recipients 1 year apart became sick with hepatitis 4 months after the onset of disease in the second recipient.

The resistance of hepatitis virus (both SH and IH) to physical and chemical agents is such that there is no practicable way to treat all the products of human blood to render them safe. It is not known whether alcohol, ether, and benzalkonium chloride are effective in destroying either form of hepatitis virus. Recent attempts to sterilize whole blood of SH virus by the addition of nitrogen mustard were unsuccessful *(30)*.

Methods of treatment of individual fractions of human blood have been devised which appear to be effective. Exposure of human albumin to a temperature of 60° C. for 10 hours inactivates the virus without influencing the therapeutic value of the albumin *(31)*. Earlier investigations of the effect of irradiation of plasma with ultraviolet light suggested that inactivation of hepatitis virus occurred experimentally *(32)*. Although this method has been generally employed to prepare this

(30) Drake, M. E.; Stokes, J., Jr.; Hampil, B.; Pennell, R. B.; and Spizizen, J.: Effect of nitrogen mustard (methyl-bis beta chloro-ethyl amine hydrochloride) on virus of serum hepatitis (SH) in whole blood. To be published.

(31) Gellis, S. S.; Neefe, J. R.; Stokes, J., Jr.; Strong, L. E.; Janeway, C. A.; and Scatchard, G.: Chemical, clinical, and immunological studies on products of human plasma fractionation; inactivation of virus of homologous serum hepatitis in solutions of normal human serum albumin by means of heat. J. Clin. Investigation 27: 239-244, Mar. 1948.

(32) Blanchard, M. C.; Stokes, J., Jr.; Hampil, B.; Wade, G. R.; and Spizizen, J.: Methods of protection against homologous serum hepatitis; inactivation of hepatitis virus SH with ultraviolet rays. J. A. M. A. 138: 341-343, Oct. 2, 1948.

material for transfusion, cases of hepatitis following the reception of irradiated plasma have been reported *(33)*. Whether this indicates qualitative or quantitative differences in virus or an actual failure of the method as now practiced is not clearly defined.

Unfortunately, adequate follow-up studies for the development of hepatitis following injections of gamma globulin have not been documented, but the subsequent occurrence of hepatitis is thought to be rare. It is likely, however, that hepatitis virus is distributed in all fractions of icterogenic plasma and it has been assumed that it is neutralized in the gamma globulin by an excess of antibody. Cockburn et al. *(34)* recently called attention to a single case of hepatitis following the injection of gamma globulin prepared from a proved icterogenic pool of plasma. Whether or not this single case represented an example of artificial transmission, thereby incriminating gamma globulin, or rather was a spontaneously appearing case of the naturally acquired disease is not known.

SUMMARY

The reports of the adaptation of hepatitis virus (IH and SH) to tissue culture and/or embryonated eggs offer great encouragement for the possibility of providing methods of study, diagnosis, and ultimate prevention of disease.

The high incidence of hepatitis in troops and the tremendous loss of effective man-days require refinement of diagnostic methods and re-examination of the criteria for recovery in such a way that the greatest number of men are returned to duty in the shortest period of time with the least hazard of relapse or residual disease.

The need for developing reliable methods for detecting carriers of virus as well as methods for sterilizing plasma and whole blood is urgent.

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(33) James, G.; Koms, R. F.; and Wright, A. W.: Homologous serum jaundice associated with use of irradiated plasma; preliminary report. J. A. M. A. 144: 228-229, Sept. 16, 1950.

(34) Cockburn, W. C.; Harrington, J. A.; Zeitlin, R. A.; Morris, D.; and Camps, F. E.: Homologous serum hepatitis and measles prophylaxis; a report to the Medical Research Council. Brit. M. J. 2: 6-12, July 7, 1951.

Acute Carbon Tetrachloride Poisoning

Friedrichs H. Harris, *Lieutenant, junior grade, MC, U. S. N. R.*

THE danger involved in the use of carbon tetrachloride is again called to the attention of all medical officers by this report of an epidemic of poisoning which occurred at the Gunner's Mate School, U. S. Naval Receiving Station, Washington, D. C. On 26 December 1951, a 50-gallon drum of carbon tetrachloride was opened in the school and distributed in smaller containers. It was used for cleaning guns in a 243- by 148- by 13- to 23-foot building in which many of the windows were closed. Seventy-eight men were directly or indirectly exposed for from 1 to 16 hours to an unknown concentration of carbon tetrachloride fumes. With such a length of exposure, the maximum concentration for safety is given as 100 p. p. m. *(1)*. Two days later men began to report to the dispensary complaining most commonly of anorexia, nausea, and vomiting. A few had diarrhea also. It was thought that an epidemic of acute gastroenteritis was occurring, but efforts to find a common food source were unsuccessful. Then a urinalysis on one of the men showed dark-brown urine with 4 plus albumin and a gunner's mate dated the onset of his symptoms as 26 December after cleaning guns at the school. Carbon tetrachloride was thereby established as the etiologic agent.

Of the 78 men exposed to carbon tetrachloride, 54 were working directly with it and 24 were merely in the vicinity. Forty-nine reported symptoms of some kind on questionnaires distributed for this investigation (table 1), 41 of these having been exposed directly and 8 indirectly. The signs developed by these 49 are listed in table 2. Only 15 men became uncomfortable enough to seek medical aid. These are the only ones considered to have been poisoned. Eight of the 15 patients had to be admitted to the dispensary ward and of these, 6 were later transferred to the U. S. Naval Hospital, Bethesda, Md. Eleven of the 15, including all 6 who were transferred to the hospital, showed

(1) Cushny, A. R.: Pharmacology and Therapeutics. 13th edition, revised by A. Grollman and D. Slaughter. Lea & Febiger, Philadelphia, Pa., 1947. p. 765.

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albuminuria of some degree. Of the 5 patients retained at the dispensary, 2 were apparently well after 3 days' treatment. The remaining 3 were treated on an outpatient basis and their albuminuria completely subsided within 5 days after exposure. Urinalysis on the remainder of the men exposed was negative.

TABLE 1. *Frequency of symptoms resulting from exposure to carbon tetrachloride*

Symptom	*Patients*
Nausea	37
Giddiness	23
Vomiting	21
Dark urine	15
Diarrhea	10
Oliguria	9
Headache	2
Anuria	1
Indigestion	1
Nervous tension	1

Of the 6 men sent to the hospital, 5 had clinical jaundice, and the other had complete anuria for about 36 hours, beginning 24 hours after exposure. His blood urea nitrogen reached a high of 209.5 mg. per 100 cc. on 9 January 1952, 14 days after exposure. The blood urea nitrogen level of the remaining 5 was elevated and the serum bilirubin level (determined on 3 of these patients on admission) was very high in 2 and normal in 1. The serum bilirubin determination (performed on the other 2 on 14 January) was normal. Two of the men developed subconjunctival hemorrhages so that almost the entire sclera appeared red instead of white. One other developed a much less pronounced subconjunctival hemorrhage. No other bleeding tendencies were evident in the group. Only 1 man developed a complication. He contracted pneumonia 4 days after exposure. Each of these 6 men spent 54 days

TABLE 2. *Frequency of signs resulting from exposure to carbon tetrachloride*

Fever (99 to 100.2° F.)	10*
Jaundice	6
Subconjunctival hemorrhage	3
Dehydration	3

*Does not include 1 patient who developed pneumonia.

on the sick list. They were all discharged from the hospital on 20 February, the results of their liver and kidney function tests being normal. The recommendation was made by the hospital that they be on limited duty for 3 months and re-evaluated at the end of that time. The clinical findings in these patients are summarized in table 3.

The treatment of these patients was supportive and symptomatic except for the use of calcium gluconate intravenously and penicillin for the patient with pneumonia. Fluids were given intravenously when deemed necessary. A mixture containing tincture of belladonna, lactate of pepsin, and elixir of phenobarbital was given to alleviate the nausea. When able to eat again, patients in the hospital were given methionine, choline, vitamin B, and a low-fat diet. They were also given vitamin K and liver extract intramuscularly.

DISCUSSION

It is not immediately apparent why 15 men out of the 78 exposed to carbon tetrachloride fumes were poisoned and why 6 of these became so ill as to require hospitalization. All were white men within 5 to 8 years of the same age and in good general health. How many of them had a previous history of kidney or liver disease was not ascertained except for the 6 hospitalized patients. It is probable that none had active liver or kidney disease at the time of exposure.

The most likely factors would be length and concentration of exposure. All 15 of the men poisoned were exposed for from 3 to 8 hours; however, many of those who developed no symptoms were exposed for a similar length of time or longer. All 15 worked directly with the material except 2 who were merely in the building for 8 hours. These 2 men also happened to be in the group of 11 that developed albuminuria. Forty-one others worked directly with carbon tetrachloride and did not get as sick as the 15. It might be assumed that all the men using the agent directly (cleaning with rags soaked in it) were exposed to about the same concentration because there was little difference in aeration in the building. It was impossible to calculate the actual concentration of carbon tetrachloride fumes in the building.

Another factor peculiar to a great many of the group was the ingestion of alcoholic beverages the night before (Christmas night), and by some on the night of exposure. Many were suffering from hangovers on the day of exposure and thought at first that the symptoms were on that basis. Of those men with symptoms, 63 percent had ingested alcoholic beverages the night before or more recently (table 4). Of those who drank alcohol 74 percent and of those who drank no alcohol 50 percent had symptoms. One man claiming to have imbibed a case of beer and a gallon of wine on Christmas Eve worked directly with the material for 6 hours, however, and developed only transient nausea and giddiness. Another drank a case of beer and 8 oz. of whisky on Christmas Day and suffered no symptoms, even though he worked directly with carbon

TABLE 3. *Summary of clinical data of 6 patients hospitalized*

Patient	Serum bilirubin level			Blood urea nitrogen level			Albuminuria disappeared*	No more cells in urine*	No more vomiting*	Past history	Remarks
	Highest		Normal	Highest		Normal					
	Mg. per 100 cc.	Day*	Day*	Mg. per 100 cc.	Day*	Day*					
1	0.44	3	3	209.5	14	19	20	20	10	In hospital 21 months before exposure for 28 days with abdominal pain	Anuria for 36 hours. Urine output normal in 11 days. ECG showed sinus arrhythmia with premature auricular and nodal contractions 5 days after exposure. Normal in 7 days. Singultus severe in early days of hospitalization. On seriously ill list 9 days.
2	5.30	3	21	72.0	3	26	13	13	6	Infectious hepatitis early in 1951; hospitalized 2 months	Developed subconjunctival hemorrhage.
3	3.90	3	20	71.0	4	21	5	41	4	Negative	Headache and irritability were predominant complaints.

TABLE 3. *Summary of clinical data of 6 patients hospitalized*—Continued

Patient	Serum bilirubin level			Blood urea nitrogen level			Albuminuria disappeared*	No more cells in urine*	No more vomiting*	Past history	Remarks
	Highest		Normal	Highest		Normal					
	Mg. per 100 cc.	Day*	Day*	Mg. per 100 cc.	Day*	Day*					
4	1.40	5	5	101.5	14	21	13	13	7	Negative	Pneumonitis in base of right lung seen in roentgenogram on 5 January (no fever or cough). Normal roentgenogram of chest on 21 January.
5	1.40	19	19	122	8	19	9	40	8	Negative	Proved pneumonia at dispensary 4 days after exposure. Treated with penicillin. Roentgenogram at hospital 7 days after exposure showed clearing. Developed subconjunctival hemorrhage.
6	0.44	22	22	22.0	5	8	5	39	5	"Yellow jaundice" at age 14 years	Remained in hospital only because of continued spillage of abnormal numbers of cells in urine.

*Refers to days after exposure.

tetrachloride for 8 hours. Of the 15 patients with poisoning all except 1 had drunk alcoholic beverages. This one was among the least affected. All 6 hospitalized patients were known "steady drinkers" and all had drunk large quantities of some type of alcoholic beverage on Christmas. The statement of many as to the quantity of their alcoholic intake was vague and little significance could be attached to it.

TABLE 4. *Correlation of alcoholic consumption with development of symptoms in 78 men exposed to carbon tetrachloride fumes*

	Number with symptoms	*Number without symptoms*	*Total*
Drank alcohol	31	11	42
Drank no alcohol	18	18	36
Total	49	29	78

CONCLUSIONS

Carbon tetrachloride is still a source of danger in the Navy. Exposure to concentrated fumes for 3 hours is enough to cause serious kidney and/or liver damage. Alcoholic intake prior to and immediately after exposure to carbon tetrachloride enhances the development of poisoning. The use of carbon tetrachloride by naval personnel should be discontinued.

BOOKS RECEIVED

The 1951 Year Book of Dermatology and Syphilology (December 1950 - November 1951), Edited by *Marion B. Sulzberger*, M. D., Professor and Chairman, Department of Dermatology and Syphilology, New York University Post-Graduate Medical School; Director of Dermatology and Syphilology, Skin and Cancer Unit and University Hospital, New York University-Bellevue Medical Center, and *Rudolf L. Baer*, M. D., Associate Professor of Clinical Dermatology and Syphilology, New York University Post-Graduate Medical School; Associate Director, Skin and Cancer Unit, and Attending Dermatologist, New York University Hospital. 476 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $5.50.

Tuberculosis of Bone and Joint, by *G. R. Girdlestone*, Sometime Nuffield Professor of Orthopaedic Surgery in the University of Oxford, and *E. W. Somerville*, M. B., F. R. C. S. (Ed.), Orthopaedic Surgeon to the Wingfield-Morris Orthopaedic Hospital, Oxford, From the Nuffield Orthopaedic Centre. 2d edition. 314 pages; illustrated. Geoffrey Cumberlege, Oxford University Press, New York, N. Y., publisher, 1952.

Methyl Alcohol Poisoning

Floyd B. Bralliar, *Surgeon, U. S. P. H. S.* (1)

ON any given day there are about 17,500 inmates in federal prison facilities in the United States. During each year there will be incarcerated in the United States in various city, county, state, and federal penal institutions about 1 million persons (2). By their very nature these persons compose a large group who for the most part will be searching for ways and means of providing themselves "a lift," preferably by drinking alcohol. To this group may be added the thousands hospitalized for chronic illness in various hospitals, such as veterans hospitals, tuberculosis sanatoriums, mental hospitals, alcoholic cure homes, and others. In order to forget the reality of their situation for a short time these persons have resorted to the ingestion of various substances. Thus in penal institutions especially, and in the other institutions mentioned to a lesser extent, it is necessary that the contents of fire extinguishers be kept from being drunk. Carbon tetrachloride; laboratory dyes and staining solutions; varnish, paint thinners, and paint or varnish removers; shaving lotions; and hair tonics are favorite beverages. Some have even thought penicillin in oil would give them a jag. The favorite of all is "home-brew." All of these and others not mentioned are fraught with varying amounts of danger. Some of the most commonly imbibed beverages mentioned above have as a basic constituent methyl alcohol, which the drinker mistakenly believes to be grain alcohol.

Thus it was that on 20 August 1951 an outbreak of methyl alcohol poisoning occurred at this institution. Nineteen men admitted drinking varying amounts of paint thinner, 90 percent of which was methyl alcohol. None of these patients admitted ingestion of the illicit substance until after the first death had occurred. There were no deaths in these 19 patients and a permanent loss of central vision occurred in only 1. The following is the case report of the patient who died.

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(1) Federal Correctional Institution, Ashland, Ky., at time of writing; now at Federal Correctional Institution, Englewood, Colo.

(2) Alexander, M.: Personal communication from Assistant Director, Bureau of Prisons, Washington, D. C.

CASE REPORT

On 8 August 1951 a 32-year-old man was admitted to the hospital complaining of nausea and vomiting of 1 hour's duration. He had been in good health and did not appear to be in any particular distress, but he did exhibit slight signs of intoxication, such as a slight weave in his walk. No odor of alcohol was noted on his breath and he steadfastly denied drinking or ingesting any alcohol or other unauthorized fluid. He stated that his supper from the previous evening had not agreed with him and the impression was, therefore, that the condition was a nonspecific gastroenteritis. On admission to the hospital he quieted down and seemed to feel better, but about 45 minutes after admission he became restless, went into coma, had a convulsive episode, and died.

When this became known another patient who had been admitted at the same time with the same symptoms admitted that they had both been drinking paint thinner about 36 hours prior to admission. A call was sent out for all others who had drunk the material to report to the hospital immediately and 18 responded.

Methyl alcohol is widely used in antifreeze, toilet articles, laboratory materials, and paint solvents. The high toxicity of methyl alcohol as compared with ethyl alcohol is due to its slower oxidation and its incomplete oxidation to formic acid and formaldehyde, the former being 6 and the latter 30 times more toxic than the original methyl alcohol (3).

The *functional disturbance* following the ingestion of methyl alcohol will be summarized. Individual susceptibility varies greatly, some persons apparently being nearly immune and others developing toxic symptoms after exposure to only small amounts. Tolerance is not acquired. Impurities are not an influencing factor (4). After its formation formic acid is spread to all parts of the body and poisoning is manifested by the rapid onset of acidosis which may be demonstrated by examining the blood or urine. Large doses of ethyl alcohol cause inhibition and arrest of the respiratory centers by causing a decreased circulation to the respiratory center, involvement of the motor centers of the costophrenic nerves, and, finally, involvment of the phrenic nerve centers. Menne (5) believes these same factors are involved in acute methyl alcohol poisoning.

One-third of the total *ingested* alcohol remains in the body tissues 48 hours after consumption (6). Toxic effects may also be obtained by

(3) Friedman, B.: Deep cupping of nerve head in atrophy of optic nerve due to methyl alcohol, complicated by amblyopia due to tobacco and ethyl alcohol. Arch. Ophth. 26: 6-11, July 1941.

(4) Fink, W. H.: Ocular pathology of methyl-alcohol poisoning. Am. J. Ophth. 26: 694, July; 802-815, Aug. 1943.

(5) Menne, F. R.: Acute methyl alcohol poisoning; report of 22 instances with postmortem examinations. Arch. Path. 26: 77-92, July 1938.

(6) Merritt, W. A., and Brown, A. E.: Methyl alcohol poisoning; report of case. Proc. Staff Meet., Mayo Clin. 16: 666-669, Oct. 15, 1941.

absorption through the respiratory mucosa or through the skin. There is some diversity of opinion as to whether there is organ selectivity. Keeney and Mellinkoff (7) showed that methyl alcohol has a high affinity for water and a low affinity for fat. They give this as the reason the eyes are so often affected in methyl alcohol poisoning. Of all the body fluids the aqueous and vitreous humors have the highest percent of water and both are fat free. Bogen (8) pointed out that although ethyl alcohol has a greater immediate toxicity, the circumstances in which methyl alcohol is often taken result in a higher blood concentration and more rapid drinking with a resultant larger dose being taken before alcoholic stupor or other symptoms develop. Although formic acid can definitely be demonstrated in vivo, no one has shown that formaldehyde is formed in vivo for this product combines with tissues immediately (7). The main avenue of escape for the methyl alcohol is through the lungs.

The lethal dose of methyl alcohol is variable, death having been caused by as little as 4 cc. The usual lethal dose is from 100 to 250 cc. (9). Doses of from 10 to 60 cc. have repeatedly caused death, whereas much larger doses have been taken without ill effect (10). From an analysis of the present series of cases a lethal dose would seem to be more than 100 cc. of pure methanol. In this group 11 patients drank less than 100 cc. and 8 drank more than 100 cc.; 3 drank over 200 cc. and lived. The amount drunk by the patient who died is unknown. Assuming that he drank as much as patient 12 who lived and gave the history of having drunk the most, the mortality rate in those drinking over 100 cc. in this series would be 11 percent; in those drinking over 200 cc., 20 percent; and in those drinking over 300 cc., 50 percent. The mortality rate of the series as a whole was 5 percent.

The early *symptoms* of methyl alcohol poisoning are similar to those of ethyl alcohol intoxication and the serious nature of the condition will not be suspected if the history is negative. This has often led to improper treatment, as in our patient who died. Early symptoms consist of headache, nausea and vomiting, dizziness, and sleepiness. After from 24 to 36 hours with the onset of late symptoms there are abdominal cramps, especially in the epigastric region and left upper abdominal quadrant, nausea and vomiting, and a partial or complete loss of vision, recognized as such by the patient, instead of a mere blurring. The pulse may be thready, the blood pressure diminished, and the respiration depressed. Voegtlin and Watts (11) have emphasized,

(7) Keeney, A. H., and Mellinkoff, S. M.: Methyl alcohol poisoning. Ann. Int. Med. 34: 331-338, Feb. 1951.

(8) Bogen, E.: Methanol poisoning. California Med. 65: 230-234, Nov. 1946.

(9) Rennie, T. A. C.: Methyl alcohol. In Cecil, R. L. (editor): Textbook of Medicine. 7th edition. W. B. Saunders Co., Philadelphia, Pa., 1949. pp. 597-598.

(10) Chew, W. B.; Berger, E. H.; Brines, O. A.; and Capron, M. J.: Alkali treatment of methyl alcohol poisoning. J. A. M. A. 130: 61-64, Jan. 12, 1946.

(11) Voegtlin, W. L., and Watts, C. E.: Acute methyl alcohol (methanol) poisoning; synopsis of subject with case report. U. S. Nav. M. Bull. 41: 1715-1720, Nov. 1943.

TABLE 1. *Summary of findings in 20 patients who drank methyl alcohol*

Patient	Amount of thinner ingested (cc.)	Equivalent amount of pure methanol (cc.)	CO_2 combining power		Ocular symptoms	Vision							
			Initial (volumes per 100 cc.)	After 24 hours' treatment (volumes per 100 cc.)		Prior to ingestion		3 days after ingestion		1 week after ingestion		1 month after ingestion	
						O. D.	O. S.	O. D.	O. S.	O. D.	O. S.	O. D.	O. S.
1	?	?	?	?	0	x	x	x	x	x	x	x	x
2	75	67.5	35.3	85.9	+++	20/25	20/20	20/70	Fingers at 14 inches	20/25	20/70	20/25	20/40
3	210	189	21.9	67.3	++	20/20	20/20	20/25	20/25	20/20	20/20	20/20	20/20
4	60	54	53.1	-	+++	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
5	240	216	31.4	64.3	0	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
6	15	13.5	49.3	-	0	20/20	20/30	20/20	20/20	20/20-1	20/20-2	x	x
7	240	216	41.2	-	+	20/20	Light only	20/20	4/200	20/20	4/200	20/20	6/200
8	210	189	39.3	-	0	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
9	15	13.5	49.1	-	0	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
10	240	216	39.3	-	0	20/40	20/40	20/40	20/25	20/30	20/25	20/25	20/20

TABLE 1. *Summary of findings in 20 patients who drank methyl alcohol*—Continued

Patient	Amount of thinner ingested (cc.)	Equivalent amount of pure methanol (cc.)	CO_2 combining power		Ocular symptoms	Vision							
			Initial (volumes per 100 cc.)	After 24 hours' treatment (volumes per 100 cc.)		Prior to ingestion		3 days after ingestion		1 week after ingestion		1 month after ingestion	
						O. D.	O. S.	O. D.	O. S.	O. D.	O. S.	O. D.	O. S.
11	180	162	19.5	64.3	0	20/20	20/50	20/100	20/50	20/100	20/30	20/100	20/20-2
12	330	297	49.4	-	++++	20/20	20/20	Blind	Blind	x	x	6/200	Fingers at six inches
13	75	67.5	44.2	-	+	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
14	15	13.5	41.2	-	0	20/20	20/20	20/20	20/20	20/20	20/20	20/20	20/20
15	60	54	50.3	-	0	20/20	20/20	20/30-1	20/20	20/30-1	20/30+3	20/40	20/20-2
16	60	54	43.4	-	0	20/50	20/40	20/25-2	20/20	20/40	20/20	20/25-1	20/20
17	30	27	45.3	-	0	20/20	20/20	20/20	20/20	20/20	20/20	x	x
18	180	162	39.3	-	+++	20/50	20/20	20/50	20/20	20/50	20/20	20/50	20/25
19	60	54	47.2	-	0	20/20	20/20	20/20	20/20	20/20-2	20/20-4	x	x
20	90	81	49.3	-	0	20/60	20/25	20/70-1	20/40-3	20/70	20/30-1	20/70	20/30

however, that consciousness is often not impaired and the respiration and circulatory system may remain apparently normal up until the time of the onset of coma. One of the outstanding signs of methanol poisoning is the dilation of pupils that do not respond to light. By the time the patient has gone from 24 to 36 hours before consulting a physician, the odor of alcohol has left the breath, thereby obscuring the proper diagnosis. There may, however, be an odor of acetone on the breath if the patient is acidotic or approaching that state, or even in coma, but the formic acid that may be in the urine will reduce Fehling's solution and this would easily lead one to a diagnosis of acidosis or coma due to diabetes with resultant improper treatment. Prostration is a late symptom. Once the patient has lapsed into coma the prognosis is extremely poor. The loss of vision usually reaches its maximum in from 24 to 48 hours. In about a week there may be full recovery of vision. If the initial loss of vision was severe it may be completely lost again during the second week, this time permanently *(3)*. If there is a permanent partial loss of vision the usual finding is a central scotoma *(12)*. The carbon dioxide combining power and ocular symptoms in this series are summarized in table 1.

The *diagnosis* is best made by a history, when available, of drinking some unusual beverage from 24 to 36 hours prior to the onset of severe symptoms. An episode of intoxication presumed to be due to alcohol in which the symptoms become more severe instead of less severe on the second day should arouse suspicion. The other main factor in diagnosis is dilation of pupils that do not react to light. The strongly acid reaction of the urine may also be an aid.

Treatment. There is some controversy regarding certain recommended procedures. Some physicians have used ethyl alcohol in the treatment of methyl alcohol poisoning in an attempt to liberate the methyl alcohol for excretion. This would seem to be comparable to fighting a gasoline fire with kerosene. Many times ethyl alcohol has been ingested in conjunction with the methyl alcohol and this has apparently done nothing to lessen the toxicity of the methanol. Some physicians have recommended gastric lavage, regardless of how much time has elapsed after the ingestion of the methanol, in spite of the fact that methyl alcohol is completely absorbed within 2 hours after it is taken. The stated rationale for this has been that some of the methanol is secreted in the gastric juice. In order to be at all effective, however, the gastric lavage would have to be repeated or continuous. The discomfort caused by the gastric tube and the small amount of methanol obtained in that way would outweigh any advantage this treatment might have. Furthermore, the fact that the patient should eat a good diet during his illness would make continuous gastric lavage impracticable.

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(12) Colebatch, J. H.: Acute methyl alcohol poisoning. Proc. Roy. Australasian Coll. Phys. 58-68, July 1946.

Another recommended procedure is a spinal tap to decrease the cerebral edema, especially in those patients with symptoms of cerebral irritation. Because such a procedure (1) causes apprehension in an already apprehensive patient and (2) may be excessively time-consuming if many patients are admitted to a hospital at the same time, this is not to be recommended as a routine. An intravenous infusion of hypertonic dextrose, preferably a 10 percent solution, would decrease the cerebral edema and would have the added advantages of giving some protection to the liver and causing a diuresis (about 4 percent of the poison is normally excreted in the urine). Furthermore, this is less time-consuming and does not cause as much apprehension on the part of the patient.

Other physicians have recommended placing all patients with optic symptoms in a dark room. We did not follow this procedure, but instead placed the patients with affected vision on the north side of the building. All those patients who did not have complete loss of vision completely regained their full vision. The one patient who did completely lose his vision had a partial return of his sight associated with bilateral residual central scotomas. Therefore, it would seem that complete darkness is not necessary for the treatment of these patients although it would seem advisable to keep them away from strong light. This again would have the effect of decreasing their apprehension.

Our main objective in treatment was to combat acidosis. This was done by the oral administration of 3.3 grams of sodium bicarbonate, every 6 hours. Patients 3 and 11 were given 4 grams every 4 hours because clinically and according to their carbon dioxide combining power they were more acutely ill than the others. Any patient who admitted having drunk some of the paint thinner within 12 hours before admission was given 100 cc. of saturated magnesium sulfate solution orally in an attempt to clear the gastrointestinal tract rapidly of any residual of the poison. Patients who showed signs of cerebral irritation were given 1,000 cc. of 10 percent dextrose in water intravenously in an attempt to reduce any cerebral edema. Patients 2, 3, and 7 were treated in this manner. Those patients who showed serious clinical symptoms or who had a marked acidosis as shown by the carbon dioxide combining power were given in addition to the sodium bicarbonate 1,000 cc. of M/6 sodium lactate solution. Patients 2, 3, and 11 were treated in this manner.

The progress of treatment was followed in most instances by daily examination of the urine for the pH and for acetone. It was found that if an alkaline urine was maintained the acidosis was adequately controlled. This method is simpler, less time-consuming, and less expensive than attempting to check the carbon dioxide combining power of all patients 24 hours after starting treatment to determine more accurately the results of therapy. This was, however, done on patients 2, 3, 5, and 11.

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Myotonia Atrophica[1]

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MYOTONIA atrophica is a chronic, slowly progressive disease of unknown cause characterized by visual, muscular, and glandular disturbances. It is uncommon but not rare and can easily be missed unless advanced muscle wasting is evident.

CASE REPORT

A 26-year-old man was admitted on 21 November 1951 for acute gastroenteritis which responded promptly to nonspecific therapy. For the preceding 2 years, progressive weakness with decreased muscular efficiency had been present and a weight loss of 30 lb. had occurred in the preceding 6 months. For about 5 years prior to admission, diplopia and word blindness, increasing in severity and not relieved by refraction, had been developing. A decrease in libido had been present for 1 year.

The patient's 65-year-old father had experienced weakness for the preceding 10 years and visual difficulty for the preceding 15 years. He had been unable to work since the inception of his visual difficulty.

Physical examination revealed a thin white man with inert apathetic facies. His blood pressure was 90/60 and his pulse was 60. Atrophy of the temporal, masseter, orbicularis oculi, and orbicularis oris muscles gave the face a "tapir" appearance. Partial ptosis of both eyelids which did not progress on fixed gaze was noted. Convergence was poor, resulting in diplopia which was also present on lateral gaze. The pupils dilated poorly with homatropine and the fundi were negative. Atrophy of the sternocleidomastoid, shoulder girdle, arm and forearm musculature was present and generalized weakness was demonstrated.

There were no fasciculations, flaccidity, or spasticity. Deep tendon reflexes were slightly diminished in the upper extremity and were normal in the lower extremity. A myotonic reaction was elicited over the thenar eminence bilaterally and was characterized by prompt and prolonged contraction with slow relaxation. This finding was not elsewhere demonstrable. There was no difficulty in relaxing handgrips.

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The bone marrow was hypercellular and a mild erythroid hyperplasia was found. The erythrocytic-myeloid ratio was 1:1.5. The 24-hour urine creatinine was 0.71 grams (normal 1.5 to 2 grams). Slit lamp studies performed several days after admission showed clouding of the anterior adult nucleus, many small opacities throughout the lens cortex, and an imperfect stellate opacity in the posterior cortex. Specimens from the gastrocnemius and a forearm muscle were normal. Psychometric studies revealed no evidence of mental deterioration.

The diagnosis of myotonia atrophica was supported by the findings of selective muscle atrophy, percussion myotonia, bilateral lenticular opacities, diminished libido, diminished urinary output of creatinine and the probability that the patient's father had the same disease.

DISCUSSION

The myotonias exist in two forms: Myotonia congenita and myotonia atrophica, the former occurring in childhood and the latter beginning usually between the ages of 20 and 35 years. Both probably represent different stages of the same defect *(2)*. Myotonia is a symptom that finds classical representation in myotonia congenita and may be minimal or absent in myotonia atrophica *(3)*. The latter situation existed in our patient. When present, it is seen as inhibition of voluntary movement because of increased muscle irritability and "after spasm" caused by delayed relaxation. The site of the defect is not known *(2)* but may occur after blocking of the motor nerve. Myotonia atrophica runs in families *(2)* and Thomasen's cases *(4)* occurred equally in male and female patients as a dominant trait. Although the family history in our patient is inconclusive, dominant transmission is suggested.

The atrophied muscles show no characteristic changes and the central nervous system is spared. Lenticular opacities occur in 87 percent of patients *(4, 5)* and are similar to those observed in mongolism. Glandular dystrophy, manifested by low blood sugar, low B. M. R., and diminished fertility, is seen commonly, gonadal changes being more frequent in male than in female patients. The cardiovascular findings have been reviewed by DeWind and Jones *(6)* and the most frequent abnormalities were a low P wave, prolonged P-R interval, and prolonged intraventricular conduction time. No changes have been demonstrated in the

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(2) Alpers, B. J.: Clinical Neurology. F. A. Davis Co., Philadelphia, Pa., 1945. p. 710.

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(4) Thomasen, E.: Myotonia: Thomsen's Disease (Myotonia Congenita), Paramyotonia, and Dystrophia Myotonica: A Clinical and Heredobiologic Investigation. Translated from Danish by F. B. Carlsen. Aarhus: Universitets-forlaget i Aarhus, 1948.

(5) Viets, H. R., and Brown, M. R.: Diseases of muscles. Medical Progress section. New England J. Med. 245: 647-653, Oct. 25, 1951.

(6) DeWind, L. T., and Jones, R. J.: Cardiovascular observations in dystrophia myotonica. J. A. M. A. 144: 299-303, Sept. 23, 1950.

heart at autopsy. Although it is generally stated that creatine urinary output is increased (7) and creatinine urinary output is decreased (2), Zierler et al. (8) found no increase in the urinary creatine output in 2 patients and Thomasen found no characteristic changes in either of these substances in 3 patients. Although the creatine output was within normal limits in our patient, the creatinine output was diminished.

Quinine has been recommended for the control of myotonia but in general treatment for this disease is unsatisfactory. Shy et al. (9) treated 2 patients with cortisone which abolished the myotonia but did not otherwise benefit the patients.

(7) Cantarow, A., and Trumper, M.: Clinical Biochemistry. 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1949. p. 124.

(8) Zierler, K. L.; Folk, P. B.; Magladery, J. W.; and Lilienthal, J. L., Jr.: On creatinuria in man; roles of renal tubule and of muscle mass. Bull. Johns Hopkins Hosp. 85: 370-395, Nov. 1949.

(9) Shy, G. M.; Brendler, S.; Rabinovitch, R.; and McEachern, D.: Effects of cortisone in certain neuromuscular disorders. J. A. M. A. 144: 1353-1357, Dec. 16, 1950.

BOOK REVIEWS

Plastic Surgery, An Introduction for Nurses, by *C. R. McLaughlin,* M. B., Ch. B., B. Chir., F. R. C. S. E., Consultant in Plastic Surgery, Queen Victoria Hospital, East Grinstead, with special sections by other members of the Queen Victoria Hospital Staff, and illustrations by *R. H. Dale,* M. A., M. B., B. Chir., F. R. C. S. E., Senior Registrar in Plastic Surgery, Foreword by *Sir Archibald H. McIndoe,* C. B. E., M. S., M. Sc., F. R. C. S., F. A. C. S. 125 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951. Price $3.

This book on plastic surgery is primarily for nurses. So far as I know no other nursing text on plastic surgery has been published. This book is based on the personal experiences of the authors who have touched on all types of plastic surgery and have focused their discussions on the nursing problems involved in each type of plastic repair. Student and graduate nurses will find in this book an excellent sourse of information on the nursing care of patients with burns, facial fractures, skin grafts, cleft palate, and cleft lip. Stress is laid on not only the physical but also the psychologic aspect of nursing care. The authors give their reasons for the specific treatments prescribed and their material is presented in a manner that is both informative and interesting. The book is well illustrated and the chapters are short because all technical information not specifically related to nursing care has been omitted. This book is well indexed and includes a glossary.

—*Lt. Comdr. A. Danyo, NC, U. S. N.*

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Antibiotics, being the 52d Robert Boyle Lecture delivered before the Oxford University Scientific Club on June 1, 1951, by Professor *Sir Howard Florey,* F. R. S., M. A., Ph. D., Sir William Dunn School of Pathology, Oxford. 35 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $1.50.

In this book the author develops the concept of the necessity for coordinated endeavor among investigators from related fields of science in resolving research problems of great complexity. He describes the growth of our knowledge of antibiotics and gives a brief resume of the earliest recognition of antibiosis. The reader is familiarized, primarily through illustrations, with representative groups of soil micro-organisms and methods for their preliminary assay for antibiotic activity. The concerted efforts of the microbiologist, biologic chemist, and chemical engineer are cited in developing quantitative assay methods, maximum antibiotic yield, pilot plant operation, and, finally, commercial scale production. Examples are given of the methods employed by the organic chemist and physicist in isolating and identifying certain antibiotic compounds. The role of the pharmacologist and the physician in determining antibiotic toxicity, mode of action, and extent of application in clinical medicine is noted. The author discusses briefly the potential economic impact of the application of antibiotics to the fields of animal husbandry, agriculture, and horticulture, and points out the usefulness of these compounds as laboratory tools in the study of cellular metabolism and enzymology. This book will be of value to students of science by virtue of its emphasis on the interdependence of the biologic and natural sciences in modern research.

—*Lt. F. L. Davis, U. S. A. F. (MSC)*

Steps Toward Prevention of Chronic Disease. Summary of the National Conference on Chronic Disease (Preventive Aspects) Held March 12-14, 1951. Sponsor, *Commission on Chronic Illness.* Cosponsors, *U. S. Public Health Service, National Health Council.* 31 pages. Health Publications Institute, Inc., Raleigh, N. C., 1952. Price $.50.

The objectives of the conference here reported were: (1) to focus attention on prevention; (2) to stimulate the formulation of summaries of existing knowledge; (3) to find ways to use this knowledge; (4) to emphasize all common denominators in the problems of prevention and detection; (5) to direct attention of experts in professional and community groups; (6) to establish guides for planning and to encourage working agreements between agencies; (7) to delineate areas and problems of research; and (8) to summarize and publish the report of the Conference and its recommendations. This short summary bridges the presently existing gap between geriatrics and gerontology. It should be stimulating to the physician interested in the former and to those agencies interested in the latter. The extent to which the private physician will be influenced by the report is questionable, but its contents should be called to their attention, preferably through the medium of their professional organizations.—*Col. C. H. Morbouse, U. S. A. F. (MC)*

Acute Anuric Uremia

(Lower Nephron Nephrosis)

Mark F. Moots, *Captain, MC, U. S. A.*

IN THE 8063d Mobile Army Surgical Hospital during the past 6 months, we have seen 9 patients with acute anuric uremia following operation for battle wounds. In every patient severe and prolonged shock attended the wound. Seven of these patients suffered penetrating wounds of the chest or abdomen or both and 2 had multiple wounds of one or more extremity with fractures and extensive soft tissue destruction. Of these 9 patients only 1 has survived; 2 others died not of the acute anuric uremia but of hypostatic pneumonia and atelectasis which attended the primary injury. Blood chemistry determinations and ECG's are not available at a field installation of this type. The management, therefore, must be based entirely on clinical observation.

CASE REPORTS

Case 1. A 21-year-old man was admitted at 1800 hours on 6 December 1951 in severe shock from a gunshot wound of the right lower portion of his chest. He had received less than 500 cc. of plasma 1 hour previously. His blood pressure could not be ascertained. With continuous transfusion of 2,500 cc. of blood under pressure, his blood pressure rose to 120/60. He was taken to the operating room where he was found to have a right-sided hemopneumothorax, a large laceration of the lower lobe of the right lung, a laceration of the diaphragm 12 cm. long, and a laceration of the liver. The lacerations were closed, the pleural space was intubated for drainage, drains were placed in the subphrenic and subhepatic spaces, and the incision was closed. His blood pressure remained normal during and after operation. In the first 24 hours after operation he received 3,000 cc. of fluid intravenously, but because only 400 cc. of urine was excreted, his fluid intake was curtailed. Continuous gastric lavage netted 550 cc. of fluid per day. The patient was mentally clear, cooperative, alert, and calm. His daily fluid intake was limited to 1,250 cc. of a 15 percent solution of dextrose in water given intravenously with 250 cc. of 0.9 percent saline solution added every other day to balance any loss of sodium chloride. For the next 5 days, his urine excretion averaged 350 cc. daily; the urinary specific gravity was 1.015. Although the urinary volume then

rose to 1,250 cc., the specific gravity remained fixed at 1.010. On the sixth day the patient became irrational, irritable, anxious, and finally developed tetany. Ten cubic centimeters of 10 percent calcium gluconate was given intravenously every 4 hours. With the increase in urinary output, his fluid intake was increased, using the previous day's output as a guide. His blood pressure, which had averaged 160/100, rose on the ninth day to 210/140. Clinically he was acutely uremic and had Cheyne-Stokes respirations. He died on 16 December.

Case 2. A 19-year-old man was admitted at 1845 hours on 25 November 1951 in severe shock due to shell-fragment wounds of both lower extremities. He had been wounded at 1130 hours and had received 300 cc. of a salt-free albumin solution. All recorded blood pressures ranged around 80/40. Following 3 blood transfusions, his blood pressure rose to 114/70. He was then taken to the operating room. Fractures of both fibulas and the left tibia were alined; lacerations of the right anterior and posterior tibial arteries necessitated their ligation and massive soft tissue wounds were debrided. In the first 16 hours after operation he passed only 200 cc. of urine. Because he vomited 3 times, a nasogastric tube was passed. Paravertebral blocks were accomplished every 12 hours and his right foot remained warm and of good color. For the next 6 days his daily urinary output was 480, 200, 170, 200, 300, and 175 cc. respectively. He was given 1,000 cc. of 15 percent dextrose solution in water in this period. On 1 December restlessness, irritability, and tremors were noted. A few hours later he became disoriented and stuporous. He was given calcium gluconate intravenously every 4 hours and paraldehyde was used to control restlessness. He became comatose and died on 2 December.

Case 3. A 21-year-old man was admitted at 1430 hours on 17 December 1951 with a gunshot wound of the abdomen. He had been seen at a battalion aid station at 1150 hours in profound shock and had received 1 unit of plasma and 400 cc. of a salt-free albumin solution. After transfusion with 1,500 cc. of blood his blood pressure rose from 80/40 to 130/80. During surgical repair his blood pressure fell to 80/40 and remained there despite transfusion with another 1,500 cc. of blood. There was massive soilage of his peritoneal cavity with feces; there was a transection of the sigmoid colon, a laceration of the urinary bladder 4 cm. long; and there were perforations of both the anterior and posterior walls of the rectum. A sigmoid loop colostomy, a cystotomy of the bladder with closure of its perforation, a closure of the anterior rectal perforation, and later a coccygectomy (for drainage of the retrorectal space) were accomplished. Postoperatively, the blood pressure remained at 90/40 for 12 hours, despite continuous blood transfusion, and no urine was being excreted. Then the blood pressure fell to 40/0, at which time an intravenous infusion of 0.09 percent ephedrine sulfate in 5 percent dextrose solution in water by continuous drip was begun. The blood pressure rose slowly to 120/70 within 12 hours.

The infusion was stopped and the blood pressure promptly fell to 70/50. It was restarted and after 3 hours administration at 12 drops per minute the blood pressure rose to 120/80 and remained there when the infusion was stopped. During this entire period the total urinary output was 300 cc. For the next 4 days the urinary output was less than 300 cc. daily. The patient received 1,000 cc. or 1,250 cc. of 15 percent dextrose solution in water with 1,000,000 units of penicillin and 2 grams of terramycin added to it daily. He was also given 0.5 gram of streptomycin intramuscularly every 12 hours. He received either 250 cc. of saline solution or whole blood every other day. On the fourth day the patient became irrational, irritable, and uncooperative, and developed tetany shortly thereafter. Ten cubic centimeters of 10 percent calcium gluconate solution was given every 4 hours, and this controlled the tetany. On 22 December the patient began to have diuresis, excreting 2,350 cc. on the first day, and 4,300 cc. on the next day. During the second day of diuresis he developed marked muscular weakness, which was relieved dramatically with 1,000 cc. of 0.2 percent potassium chloride in normal saline solution. During these 2 days he received 4,000 cc. of 5 percent dextrose solution in water and 3,000 cc. of 5 percent dextrose in saline solution. As of the first day of diuresis the patient developed consolidation of the lower lobes of both lungs despite hourly efforts to encourage him to raise bronchial secretions. He died on 24 December.

DISCUSSION

The management of acute anuric uremia may be conveniently divided into that of the anuric or oliguric phase and that of the diuretic (polyuric) phase.

The anuric phase, which usually lasts from 5 to 10 days, is characterized by the suppression of the daily urinary output to less than 500 cc., the retention of sodium, potassium, nonprotein nitrogen, phosphates, sulfates, and organic acids in the blood with the concomitant decrease of blood chlorides and CO_2 combining power, and the development of the clinical findings of uremia. The principles which guide us in treatment through this period are the restriction of fluid intake, the suppression of protein metabolism, and the neutralization of hyperpotassemia. When a patient who has had severe and prolonged shock and has been given numerous blood transfusions before and during operation, and returns from the operating room in shock, fails to respond to transfusion postoperatively, we administer a 0.09 percent solution of ephedrine sulfate intravenously by continuous drip. We have been impressed by the value of this procedure. The fluid intake is limited to between 1,000 cc. and 1,500 cc. of 15 percent dextrose solution in water intravenously once daily, the amount depending on the amount of urine passed the previous day and the amount of fluid lost by gastric lavage. We believe that this solution supplies a large number of calories, thus decreasing protein metabolism, and keeps the serum

potassium level at a minimum. When the patient is on gastric suction, we usually give 250 cc. of 0.9 percent saline solution or 250 cc. of whole blood every other day, depending on the needs of the patient. No amount of fluid will induce urinary excretion if parenchymal renal changes are present and, hence, overloading the patient with fluids should be avoided *(1)*.

Because infection promotes protein breakdown, antibacterial drugs should be used, but most of these are excreted in the urine so that, in the presence of oliguria, smaller dosages than usually given are required. This is especially true of streptomycin, the toxic effects of which are well known.

We use calcium gluconate in the later stages of the anuric period when tetany occurs and levels of serum potassium are the highest. This procedure effectively controls the tetany and may antagonize the deleterious effects of potassium on the heart. We give 10 cc. of 10 percent calcium gluconate solution intravenously every 4 hours as needed.

When diuresis occurs, the principles are reversed. Fluid is to be forced and deficiencies of sodium, potassium, and chloride are to be avoided. To accomplish this we give liberal amounts of normal saline solution intravenously. A good rule to follow is to replace one-third to one-half of the volume of urine lost by physiologic saline solution. If a profound and unwarranted muscular weakness occurs along with irritability, paralysis, and tachycardia, we give 0.2 percent potassium chloride in normal saline solution intravenously slowly with constant check on all the manifestations commonly attributed to low serum potassium levels. If the patient can swallow and be fed by mouth, the problem becomes much simpler and copious amounts of fluids that contain sodium and potassium are given by mouth.

(1) Kolff, W. J.: Treatment of uremia; use and indication for high caloric low protein diet, dialyzing methods and replacement transfusion. Cleveland Clin. Quart. 18: 145-158, July 1951.

BOOK RECEIVED

Principles of Refraction, by *Sylvester Judd Beach,* A. B., M. D., F. A. C. S., Consultant, Staff Maine Eye and Ear Infirmary; Chief Ophthalmologist, Portland City Hospital; Member of Staff, Maine General Hospital; Past President, Portland Medical Association and New England Ophthalmological Society; Council, National Society Prevention of Blindness; Co-Founder, Ophthalmological Study Council; Member of Council, Academy Ophthalmology and Oto-Laryngology; Chairman, Section of Ophthalmology; A. M. A.: Past President, American Ophthalmological Society; Past Secretary and Emeritus Member, American Board of Ophthalmology. 158 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1952. Price $4.

Cleidocranial Dysostosis[1]

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Charles Bathrick, *First Lieutenant, U. S. A. F. (MC)*
Frederic Eldridge, *Captain, U. S. A. F. (MC)*

CLEIDOCRANIAL dysostosis is a disease of unknown cause. It is frequently hereditary and equally affects both sexes. It is characterized by : (1) absent or hypoplastic clavicles, (2) large head with bulging forehead and prominent cranial bosses, (3) delayed ossification of the fontanels, (4) delayed and incomplete ossification of the skull, and (5) the following oral manifestations: (a) underdevelopment of the maxilla making the mandible appear prominent, (b) persistence of the maxillary and mandibular deciduous teeth, (c) failure of eruption of many permanent teeth in both the maxilla and mandible, (d) unerupted supernumerary teeth in both jaws, and (e) malformed, undeveloped, and distorted roots of the teeth (2).

CASE REPORT

A 22-year-old airman was admitted to this hospital on 24 October 1951 following a routine dental examination which had disclosed retained deciduous teeth. He noted, in adolescence, that he still had his "baby" teeth, but he gave no history of unusual dental difficulties and at the time of admission was free of any symptoms. Since early childhood he had been able to closely approximate his shoulders anteriorly.

He had 2 brothers and 3 sisters. As far as could be ascertained, all had the same general physical appearance. The patient stated that one of his brothers could "bring his shoulders together and had his baby teeth" at the age of 31 years. He also thought that his father had a similar condition but because he was very young when his father died, the accuracy of this finding is in question. His mother, other brother, and 3 sisters apparently had no oral or bony abnormalities.

The patient was a short, heavy-set man of Latin-American origin. He had a moderate acne of the face and back. His head was larger than average with prominent frontal bosses and the mandible was slightly prominent. His shoulders could be almost approximated anteriorly and careful

(1) United States Air Force Hospital, Larson Air Force Base, Moses Lake, Wash.
(2) Thoma, K. H.: Oral Pathology. C. V. Mosby Co., St. Louis, Mo., 1941. pp. 329-331.

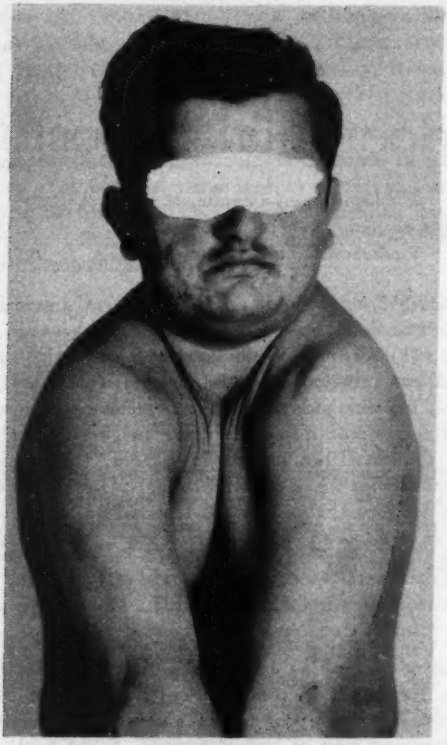

Figure 1. Photograph showing abnormal range of motion of shoulders.

palpation revealed no evidence of clavicles (fig. 1). His head measurements were: circumference, 62 cm.; occipitofrontal, 20.3 cm.; occipitobregmatic, 18.5 cm.; occipitomental, 20 cm.; biparietal, 17.3 cm.; and bitemporal, 14 cm.

In the anterior maxillary region, all the deciduous teeth (from cuspid to cuspid) were present. There was a wide diastema between the deciduous central incisors. The labial frenum was wide and attached to the maxillary alveolar ridge between the deciduous central incisors. The maxillary deciduous incisors were abraded to the gingival line. The incisal two-thirds of the deciduous cuspids were worn down. Hyalinized dentine was present over the incisal edges of the deciduous incisors. The right and left upper first premolars were absent and the second premolars were present. The maxillary left second premolar was in torsiversion and the maxillary right second premolar was partly submerged and markedly tilted toward the midline, exposing about 4 mm.

of the root's surface. The first permanent molar areas were both edentulous and the second permanent molars were present but partially erupted (fig. 2).

Figure 2. Cast showing retained, abraded deciduous anterior teeth with malposition of the 4 permanent teeth in the maxilla. Figure 3. Cast showing retention of mandibular deciduous teeth and the erupted permanent teeth.

Figure 4. Casts showing pseudoprognathism due to underdevelopment of maxilla with normally developed mandible.

In the mandible, the deciduous incisors and cuspids were erupted. All the deciduous incisors were widely separated and the incisal thirds were worn down. The central and lateral deciduous incisors were mobile. The incisal thirds of the deciduous cuspids were abraded. The mandibular right first deciduous molar was retained. There was almost complete abrasion of the coronal portion of this tooth. The space usually occupied by the mandibular right premolars was edentulous and the right second and third permanent molars were present, the third molar being partially impacted. The lower left first premolar was absent. The mandibular left second premolar was present but partially submerged and in infraocclusion. The mandibular left first and second permanent molars were present and fully erupted (fig. 3).

The maxilla appeared to be underdeveloped with a high vault. On the median line of the maxilla, a definite furrow was observed. The mandible was normally developed but appeared to be prognathic due to the micrognathic maxilla (fig. 4).

All laboratory tests were essentially normal. A roentgenogram of the chest revealed markedly underdeveloped clavicles bilaterally, measuring only 5 cm. in length and having no bony attachment at either end (fig. 5).

Figure 5. Roentgenogram of chest showing hypoplasia of clavicles.

The skull sutures were not fused. There was an open frontal suture and many wormian bones were present in the area of the lambdoidal suture lines (figs. 6-8). The mastoid areas showed no evidence of pneumatization and the maxillary and sphenoid sinuses showed an incomplete cellular type of pneumatization. The fifth, sixth, and seventh cervical vertebras showed a lack of fusion of the neural arches and the upper thoracic vertebras all showed bifid neural arches (figs. 5 and 9). The symphysis pubis was wider than normal with areas of deficient bony development of the adjacent parts of the pubic bones (fig. 10). There was delayed epiphysial union (for a man of 22 years) of the distal epiphyses of tibias and fibulas, the proximal fibular epiphyses, and the distal epiphyses of the radii and ulnas. Roentgenograms of the jaw revealed many unerupted and supernumerary teeth.

Full-mouth periapical roentgenograms showed the 6 maxillary deciduous anterior teeth still present with slight resorption of the roots of the cuspids and lateral incisors. The apical thirds of the deciduous central incisors were resorbed. In the anterior maxilla, above the apexes of the deciduous teeth, the crowns of the permanent central incisors were

Figure 6. Anteroposterior view of skull showing open sutures and wormian bones. Figure 7. Occipital view of skull showing open cranial sutures and wormian bones.

Figure 8. Lateral view of skull showing open sutures, wormian bones, incomplete pneumatization of accessory air sinuses, and lack of pneumatization of the mastoid areas.

visible. The roots of the permanent central incisors could not be seen clearly. Three unerupted rudimentary supernumerary teeth were also visible in the central incisor area. On the maxillary left side beneath the apex of the deciduous lateral incisor, there was a permanent, unerupted, malposed lateral incisor. An impacted, well-formed permanent

Figure 9. Roentgenogram of chest showing spina bifida occulta.

cuspid and a supernumerary unerupted, malformed permanent cuspid were seen distal to this unerupted lateral incisor and beneath the root of the left upper deciduous cuspid. The left upper first premolar was absent and the second premolar was present and erupted. A supernumerary, immature, unerupted premolar was present at the apex of the erupted second premolar. The root of the maxillary left second premolar was tortuous and slightly resorbed. The maxillary left second permanent molar was erupted and a malformed third molar crown was superimposed on the distal root of the erupted second molar.

Figure 10. Roentgenogram of pelvis showing wide symphysis pubis due to poor osseous development of pelvic bones.

An unerupted, well-formed permanent lateral incisor was visible beneath the maxillary right deciduous lateral incisor. On the maxillary right side, in the cuspid area, the condition was similar except that an additional, malformed, unerupted, supernumerary tooth was present. In the right upper premolar area, the second premolar was erupted and the crown of the first premolar appeared to be just below the mucosa. A developing supernumerary premolar crown was seen overlapping the first premolar root. The root of the maxillary right second premolar was tortuous. The maxillary right first permanent molar was missing. The second molar and an unerupted third molar were present.

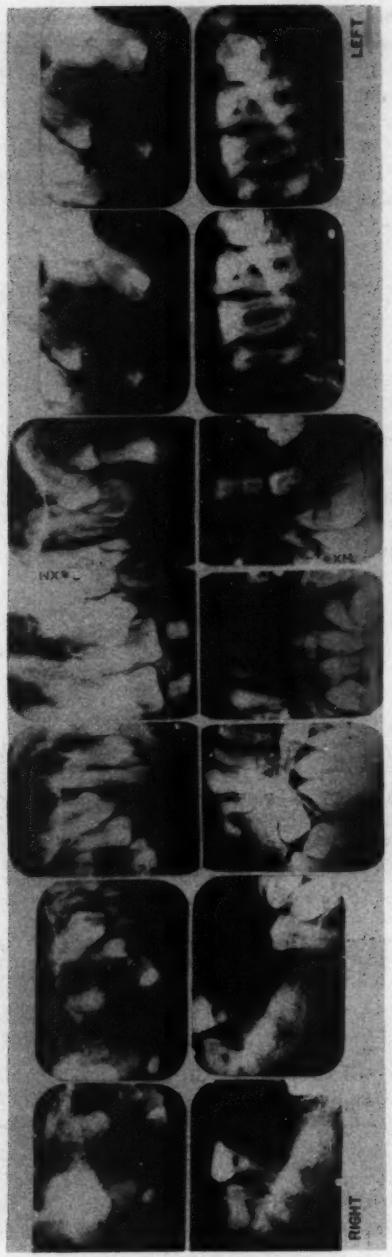

Figure 11. Full-mouth roentgenograms showing erupted, impacted, supernumerary permanent and retained deciduous teeth.

In the anterior portion of the mandible (from cuspid to cuspid) all 6 deciduous teeth were present. The apical thirds of the central and lateral deciduous incisors had been resorbed but little resorption of the deciduous cuspid roots could be seen. Beneath the apexes of the anterior deciduous teeth, several unerupted, rudimentary, malformed teeth, whose anatomic structure was discernible, could be seen, but beneath the apexes of the mandibular left and right deciduous cuspids what appeared to be 2 horizontally impacted permanent cuspids were seen. In the mandibular left premolar area, the mandibular left first premolar was present and erupted. The madibular left first and second permanent molars were present and erupted. There were 2 unerupted molars distal to the erupted mandibular left second permanent molar. The mandibular right first deciduous molar was present but the roots were almost completely resorbed. The first and second premolars on the mandibular right side were unerupted. The area usually occupied by the first permanent molar was edentulous. The mandibular right second and third permanent molars were present, well-formed, and erupted. The basal and alveolar bone appeared to be within normal limits in the maxilla and mandible (fig. 11).

A diagnosis of cleidocranial dysostosis was established because of delayed and defective dentition, marked hypoplasia of the clavicles, defective cranial sutures, wormian bones, deficient sinus development, spina bifida occulta, abnormal fusion of symphysis pubis, and delayed epiphysial union.

BOOK REVIEWS

The Drawing-Completion Test, A Projective Technique for the Investigation of Personality Based on the Wartegg Test Blank, by *G. Marian Kinget,* Ph. D., Staff Member, Counseling Center, University of Chicago, Chicago, Ill., Foreword by *Percival M. Symonds,* Ph. D., Professor of Education, Columbia University, New York, N. Y. 238 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., publisher, 1952. Price $6.75.

In this volume a rather interesting and ingenious projective device is described. Essentially, the completion test consists of a series of 8 squares, each of which contains small signs. All 8 squares are on 1 sheet of paper and the signs contained in each square vary from a dot in 1 square, to a series of dots in another, a small square in 1, a curved line in another—all signs being different. The instructions to the subject are that these signs have no special meaning and merely represent parts of drawings which the subject is requested to produce in each square. The drawings may be completed in random order but are numbered as completed. No time limit is involved in the test and the subject may use an eraser while drawing. The time taken to complete each drawing is recorded as are observations of the behavior of the subject

during the test. When the drawings are completed, the subject is asked what each of the drawings represents and the replies are also recorded. On completion of the drawings, the replies to certain questions are obtained and made part of the protocol. A rather complete system for analysis of the drawings in which the capacity and the factors involved in the personality make-up of the patient may be identified and categorized is outlined by the author. Based on this rather complex analysis of the data obtained, a personality profile of the subject may be prepared. Such factors as emotion, open and seclusive; imagination, both combinative and creative; intellect, practical and speculative; activity, dynamic and controlled, are the constituent elements of the profile.

The technic outlined by the author does not seem to provide the clinician with much more material concerning the patient than can readily be obtained by using other projective technics. Further, the scoring system outlined by the author is exceedingly complex and cumbersome, and, perhaps, in terms of time invested, is out of all proportion to the significant material which might be obtained. The data obtained by Dr. Kinget were validated against a population not stated in his volume. It can only be assumed that the validation population was either French or Belgian or both. For this reason this projective technic should be used on populations other than those on which the instrument was validated with extreme caution.

—*Col. C. S. Gersoni, MSC, U. S. A.*

Functional Mammalian Anatomy, With Special Reference to the Cat, by *William T. Taylor,* Ph. D., Professor of Biology, Georgetown University, and *Richard J. Weber,* Ph. D., Professor of Biology, Georgetown University. Illustrated by *Thomas Courtney Lee.* 575 pages. D. Van Nostrand Co., Inc., New York, N. Y., publisher, 1951.

This is a well-written and illustrated textbook of mammalian anatomy, particularly of the cat, and undoubtedly will be helpful to students of zoology, comparative anatomy, physiology, and premedical sciences. The point of view of the beginner has been kept well in mind; commonly accepted facts are concisely presented; and essential anatomic features have not been buried in a multiplicity of descriptive detail. An admirable concept in the text is not a discussion of anatomy for the sake of itself, but the thoughtful presentation of anatomy from the standpoint of function and dynamics. So often has the young medical practitioner been handicapped by the difficulty of synthesizing anatomic and pathologic entities into an understanding of how these involve or impair function, that the viewpoint of an ultimate end usage presented in this book is refreshing. This concept might profitably be used more extensively.—*Lt. Col. F. L. Bauer, MC, U. S. A.*

A Simplified Technic for Taking 35-mm. Color Photomicrographs

Robert D. Neubecker, *Lieutenant, junior grade, MC, U. S. N. R.*

WITH the increasing use of 35-mm. color slides in scientific illustration, a relatively simple technic for obtaining consistently satisfactory color photomicrographs with a minimum of equipment and inconvenience is highly desirable. I have obtained good results in photographing pathologic sections by using the following simple and convenient method. It embodies some of the more important considerations of illumination and determination of exposure time as found in the recent literature on photomicrography (1-4).

Equipment. A standard monocular microscope with substage condenser may be used. Numerous devices for attaching a 35-mm. camera box to the microscope are available. These have either a ground-glass plate or an angular observation telescope for focusing. The camera with a photomicrographic attachment is shown in figure 1. The final magnification produced on the film by this equipment is one-third the actual magnification as calculated from the objective-eyepiece combination used on the microscope. A photoelectric light meter which reads in foot candles may be used to determine the exposure times (table 1). The remainder of the equipment consists of a No. 1 photoflood lamp, condensing lens, cardboard diaphragms, and a simple housing and holder for these.

The *illumination* is second in importance only to the quality of the specimen to be photographed. It must be of correct color temperature (Kelvin temperature of the light) and the microscopic field must be

(1) Eastman Kodak Co.: Kodachrome and Ektachrome Exposure in Photomicrography. Eastman Kodak Co., Rochester, N. Y., 1947.

(2) Eastman Kodak Co.: Photomicrography of Stained Slides with Kodachrome and Ektachrome Films. Eastman Kodak Co., Rochester, N. Y., 1944.

(3) Shillaber, C. P.: Photomicrography in Theory and Practice. John Wiley & Sons, Inc., New York, N. Y., 1944.

(4) Allen, R. M.: Photomicrography. D. Van Nostrand Co., Inc., New York, N. Y., 1941.

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evenly illuminated. The first condition may be met simply by using a photoflood lamp as a light source. The variations in the voltage of ordinary house current generally will not seriously interfere with the color temperature of the light source. To obtain an even illumination of the microscopic field it is generally recommended that some type of critical illumination be used *(3,4)*. To obtain the modified type of critical illumination shown in figure 2, a photoflood lamp mounted in a simple ventilated housing is used as the light source. A field condensing lens is inserted between the light source and the microscope substage condenser. The one I have used is a plano-convex lens 3 inches in diameter and with a 5-inch focal length. A cardboard field diaphragm is placed in front of the field condenser to cut out stray light.

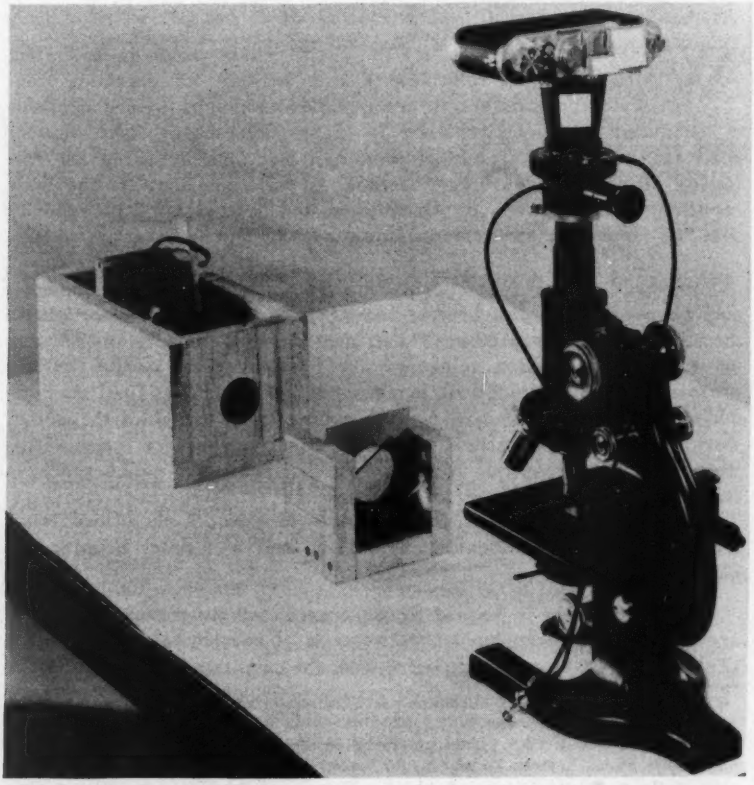

Figure 1. The equipment ready for photographing. The field condensing lens is behind the cardboard field diaphragm. A square glass filter is in place in front of the field diaphragm.

TABLE 1. *Exposure times determined for various combinations of microscope objectives and condenser numerical apertures, using the formulas described in the text*

Microscope objective	Condenser numerical aperture	Exposure meter					
		Weston Master II			General Electric type DW48		
		I_p	I	Exposure time (seconds)	I_p	I	Exposure time (seconds)
Low power 10x	0.25	6.5	4.2	0.04	10.0	3.0	0.05
Low power 10x	0.17	4.0	2.6	0.06	7.0	2.1	0.07
Low power 10x	0.09	1.4	0.9	0.17	2.7	0.81	0.18
High power, dry 45x	0.65	1.4	0.9	0.17	2.7	0.81	0.18
High power, dry 45x	0.44	1.0	0.64	0.23	2.0	0.60	0.25
High power, dry 45x	0.22	0.3	0.19	0.80	0.6	0.18	0.80
High power, oil 95x	1.25	1.2	0.77	0.20	2.1	0.63	0.24
High power, oil 95x	0.83	0.7	0.45	0.33	1.3	0.39	0.38
High power, oil 95x	0.42	0.3	0.19	0.80	0.55	0.15	1.00

D = diameter of microscopic field 8 1/3 cm. above eyepoint = 5.5 cm.
d = diameter of Weston Master II photoelectric cell = 4.4 cm.
A = area of microscopic field 8 1/3 cm. above eyepoint = 23.8 sq. cm.
a = area of General Electric DW 48 photoelectric cell = 7.2 sq. cm.
Distance between photoflood lamp (No. 1) and field condenser = 21 cm.

The field condenser is adjusted so that the image of the light source is focused on the microscope substage diaphragm. Then the substage condenser is adjusted so that the image of the field condenser lies in the object plane of the microscope. This may be easily done by looking

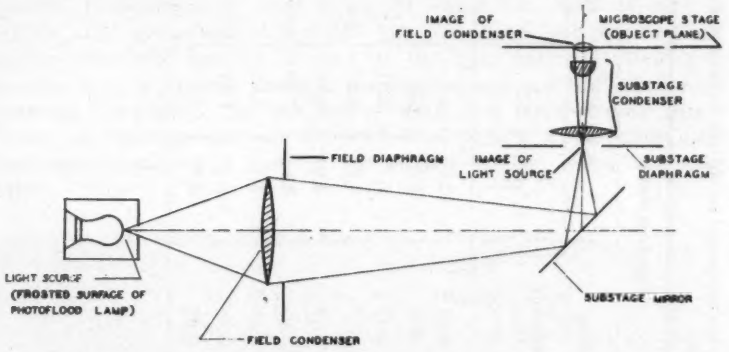

Figure 2. Diagram of the type of illumination described in the text.

through the microscope and focusing on a specimen placed on the microscope stage. The specimen is then removed and a small opaque object such as a pencil point is placed against the field condenser to facilitate focusing. The substage condenser is adjusted while looking through the microscope until the opaque object at the field condenser comes into focus.

It is important that the light enters the substage condenser perpendicularly. This may be accomplished by placing a paper screen around the field condenser, opening the substage diaphragm widely, and adjusting the substage mirror so that the small amount of light reflected back from the undersurface of the substage condenser falls squarely on the field condenser. The distance of the field condenser from the light source should be noted and kept constant whenever the apparatus is used so that the same intensity of illumination can always be reproduced.

When the low-power eyepiece of the microscope is used it is necessary to remove the top lens from the substage condenser. If it is desired to use various light filters, these may be interposed at any convenient point between the light source and the specimen to be photographed. In figure 1 a square glass filter can be seen in front of the field diaphragm.

Determination of exposure time. The exposure time in color photomicrography must be determined as accurately as possible. A method for calculating exposure times for kodachrome film is based on the formula $E_c = I.t$, or $t = E_c/I$, where E_c is the correct exposure in foot-

candle seconds, I is the illumination at the film plane in foot-candles, and t is exposure time in seconds (*1*). The value of E_c is given as 0.15 foot-candle seconds for kodachrome type A film. To determine the correct exposure time, determine the illumination in foot-candles at the film plane, that is, on the film in the camera, and apply the above formula. The illumination is determined with no specimen present on the microscope stage, using the unobstructed, bright microscope field.

An exposure meter that measures light in foot-candles can be used for determining the illumination at the film plane. Instead of measuring this directly, it is more convenient to take a meter reading of the light emerging from the eyepiece of the microscope at a level where the circle of light is contained within the limits of the sensitive surface of the photoelectric cell. It is not necessary that this circle of light be any specified or constant size but it must not extend beyond the limits of the cell. The illumination at the film plane can then be readily calculated by using the formula: $I = I_p \cdot d^2/D^2$, where I is the illumination at the film plane; I_p is the reading obtained on the photoelectric exposure meter as described above; d is the diameter of the photoelectric cell, which can be easily measured directly; and D is the diameter of the microscopic field at the film plane (*1*). D can be determined by holding a white paper above the eyepiece of the microscope at a level where the magnification that will be reproduced on the film is present, and measuring the diameter of the projected circle of light. The full magnification of the microscope is produced at a point 25 cm. above the eyepoint. The eyepoint is where the smallest circle of light is formed above the eyepiece of the microscope, usually from 3 to 5 mm. above the top lens of the eyepiece. One-third magnification will be produced at a distance of 8 1/3 cm. above the eyepoint.

If a photoelectric cell of rectangular shape is used, d^2 and D^2 must be replaced by a and A respectively, where a is the area of the photoelectric cell and A is the area of the field at the level of the magnification produced on the film. In this case the formula then becomes: $I = I_p \cdot a/A$.

The illumination can be calculated for each microscope objective and substage condenser numerical aperture commonly used. The exposure times can then be determined and entered in a table for future reference. If the same illumination is used each time a photomicrograph is taken, one need only refer to this table for the correct exposure. Table 1 is such a table.

The numerical aperture of the substage condenser may be adjusted by the substage diaphragm. Some microscopes have small numbers on the substage condenser which indicate the numerical aperture of the

condenser for various diaphragm openings. If these are not present, and also when using the low-power objective with the top lens of the substage condenser removed, the settings may be approximated by removing the eyepiece of the microscope, looking down the tube of the microscope at the circle of light in the rear lens of the objective, and closing the substage diaphragm until its edges just impinge on this circle. At this setting the numerical aperture of the substage condenser will be the same as that of the microscope objective. If the diaphragm is closed further, so that an estimated two-thirds of the area of the circle of light remains, the numerical aperture of the condenser will be two-thirds of the value of the numerical aperture of the objective and so on. The value of the numerical aperture of the objective lens will be found engraved on the lens mount. Whatever settings of the substage diaphragm are used they must be marked in some way so that they can be readily reproduced, as the illumination on the film varies greatly with changes in the numerical aperture of the substage condenser.

A didymium glass filter 2.0 mm. thick has been recommended to improve the color reproduction of some of the stains used in preparing microscopic specimens (*2*). With this filter the exposure times may have to be increased to twice the calculated value when photographing pathologic specimens. No increase in exposure is necessary when photographing thin specimens such as blood smears.

BOOK REVIEW

The Clinically Important Reflexes, by Dr. Med. *Friedrich Wilhelm Bronisch,* Instructor, University of Heidelberg; Research Assistant, Psychiatric and Neurologic Clinic, University of Heidelberg. First American edition. Revised and enlarged by *Clemens E. Benda,* M. D., Boston, Mass. 88 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1952. Price $4.75.

This handy volume lists 78 of the various deep and superficial reflexes, cranial nerve reflexes, and those reflex mechanisms of importance in the maintenance of muscular tone. It also includes a short description of some of the autonomic reflexes. The text consists of short understandable descriptions of how each reflex should be elicited, its arc, and its clinical significance. These are all summarized in a few sentences, but most are illustrated by simple diagrams. Most of the bibliographic references are from the German literature. There is a good index. The author states and attempts to follow a noble dictum: "It is well to remember that behind each reflex for which we test there is a whole human being." The price of this volume is high in proportion to its size.

—*Lt. Comdr. R. G. Berry, MC, U. S. N.*

The Treatment of Hemothorax

With Particular Reference to the Use of Streptokinase and Streptodornase

Joseph M. Miller, *Major, MC, U. S. A. R.* (1)

Perrin H. Long, *Colonel, MC, U. S. A. R.* (2)

NEARLY every patient who survives the immediate effects of a serious injury to the chest will have some degree of hemothorax. Among the fundamental principles in the treatment of this complication are the removal of clotted blood, fibrin, and cellular debris from the pleural cavity and the earliest possible re-expansion of the lung. The discoveries that streptokinase catalyzes the lysis of fibrin and fibrinogen and that streptodornase liquefies the coarse sediment in pus have suggested that these substances might prove especially useful in treating hemothorax (3-7). Streptokinase is a catalyst acting on a fibrin-lysing system in the euglobulin fraction of the blood to produce plasmin, the lytic factor for fibrin and fibrinogen. Streptodornase, an enzyme activated by magnesium or manganese ions, causes hydrolysis of desoxyribose nucleoprotein and desoxyribose nucleic acid.

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(1) Chief, Surgical Service, Veterans Administration Hospital, Fort Howard, Md.

(2) Professor, Department of Medicine, College of Medicine, State University of New York at New York City, N. Y.

(3) Miller, J. M.; Ginsberg, M.; Lipin, R. J.; and Long, P. H.: Clinical experience with streptokinase and streptodornase. J. A. M. A. 145: 620-624, Mar. 3, 1951.

(4) Read, C. T., and Berry, F. B.: Utilization of streptokinase-streptodornase in patient with hemopneumothorax and patient with postpneumonectomy sanguineous coagulum. J. Thoracic Surg. 20: 384-392, Sept. 1950.

(5) Sherry, S.; Tillett, W. S.; and Read, C. T.: Use of streptokinase-streptodornase in treatment of hemothorax. J. Thoracic Surg. 20: 393-417, Sept. 1950.

(6) Tillett, W. S., and Sherry, S.: Effect in patients of streptococcal fibrinolysin and streptococcal desoxyribonuclease on fibrinous, purulent, and sanguineous pleural exudations. J. Clin. Investigation 28: 173-190, Jan. 1949.

(7) Wright, L. T.; Smith, D. H.; Rothman, M.; Metzger, W. I.; and Quash, E. T.: Use of streptokinase-dornase in certain surgical conditions. J. Internat. Coll. Surgeons 15: 286-298, Mar. 1951.

Two factors of importance in hemothorax are the deposition of fibrin and a serous effusion, the response of the pleura to injury or sanguineous irritation. The amount of initial hemorrhage may be less important than the subsequent pleural response. The spontaneous resorption of more than moderate amounts of blood without sequelas does not occur. Delay of treatment may produce loculations. The invasion of deposits of fibrin by fibroblasts leads to encasement of the lung, prevention of expansion, and decreased respiratory function. The process of organization may be well advanced within 1 week of injury *(8)*. Traumatic hemothoraxes secondary to wounding are potentially if not actually infected. Repeated cultures may be necessary to demonstrate bacteria which may be lodged in loculations or masses of fibrin. The severity of the infection will also condition the response of the pleura by serous effusion.

The proper use of streptokinase and streptodornase will reduce the number of patients with hemothorax who must be subjected to thoracotomy and decortication. Casual use of the agents, however, may yield an unsatisfactory result. Better results have been obtained from the use of streptokinase and streptodornase with intercostal closed drainage than with thoracentesis. The enzymes, dissolved in 20 cc. of sterile isotonic saline solution, are injected through the catheter which is then occluded. Digestion proceeds for about 8 hours following which suction of minus 6 to 8 cm. of water is applied to the catheter by a Stedman pump to remove the liquefied products and to encourage the lung to expand. Because there is always a good possibility that blood in the pleural cavity will clot despite early thoracentesis, all patients in this hospital with more than a minimal degree of hemothorax are now treated with streptokinase and streptodornase with intercostal closed catheter drainage and suction.

The most effective action from the agents will be obtained when treatment is started immediately after active bleeding has stopped. Once organization of the clot or exudate has started, it is increasingly difficult to obtain liquefaction because the enzymes do not affect living cells. Nevertheless, enzymatic treatment may occasionally succeed despite delay.

Treatment with the agents is given daily because we believe that sufficient replenishment of the fibrin-lysing system in the pleural fluid occurs between injections. Therapy is guided by the temperature curve, the color of the aspirated fluid, and repeated roentgenograms of the chest. The temperature of the patient under treatment with streptokinase and streptodornase usually returns to normal when the blood has been removed from the pleural cavity. The persistence or recurrence of fever when only serous fluid is obtained is indicative of loculated blood or pus. Treatment with the agents should be stopped when the

(8) Langston, H. M., and Tuttle, W. M.: Pathology of chronic traumatic hemothorax. J. Thoracic Surg. 16: 99-116, Apr. 1947.

aspirated fluid becomes serous unless loculations of blood or pus are present.

The usual patient with traumatic hemothorax will require more than 1 or 2 treatments with streptokinase and streptodornase although some patients will respond in a dramatic manner. Sherry et al. *(5)* advised the use of from 100 to 500 units of streptokinase per cc. of estimated pleural fluid, the standard injection being 200,000 units of streptokinase. Treatment with similar doses has been given daily in this series.

The introduction of streptokinase and streptodornase into the pleural cavity of patients with hemothorax usually produces an elevation of temperature which occasionally is severe. The average rise is almost 3° F. and ranges from 2 to 5° F. The rise begins about 4 hours after the administration of the agents and lasts for about 24 hours. Malaise, headache, arthralgia, nausea, and vomiting may occur although great variation in symptoms may be seen. Although streptokinase and streptodornase are antigenic, an allergic reaction following their use has not yet been observed.

Prothrombin times have been determined in a small number of patients receiving these agents. A delay of 1 or 2 seconds has been produced in most instances, but the effect has not proved clinically significant.

Because an outpouring of serum is one of the local reactions to the agents, this is another indication for the provision of adequate drainage. The influx of fluid and the liquefaction of fibrin in the pleural cavity may displace the mediastinum (fig. 1) and cause cardiorespiratory embarrassment if the accumulated fluid is not released through a catheter. Large amounts of fluid should not be withdrawn rapidly after digestion has occurred because a mediastinal shift and attendant difficulties may result. With lysis of the fibrinous walls of the pleural pocket, large particles will be seen in the aspirated fluid. This heavier material can be washed from the pleural cavity with physiologic saline solution just before the streptokinase and streptodornase are given. If loculations exist in the pleural cavity, the patient should be placed in such a position, using a tilted bed *(9)*, as will permit the agents to wash the affected area. Loculations discovered after the removal of the catheter necessitate its reinsertion or thoracentesis. The great influx of leukocytes produces a creamy fluid best observed near the termination of treatment with streptokinase and streptodornase. In most patients the cultures are sterile. Stained smears of the fluid show numerous leukocytes.

Because wounds of the lung are sealed by fibrin in the normal process of repair, the possibility of creating a bronchopleural fistula from the use of streptokinase exists. This complication has not been seen.

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(9) Miller, J. M.: Substitute for shock blocks. Am. J. Nursing 52: 205, Feb. 1952.

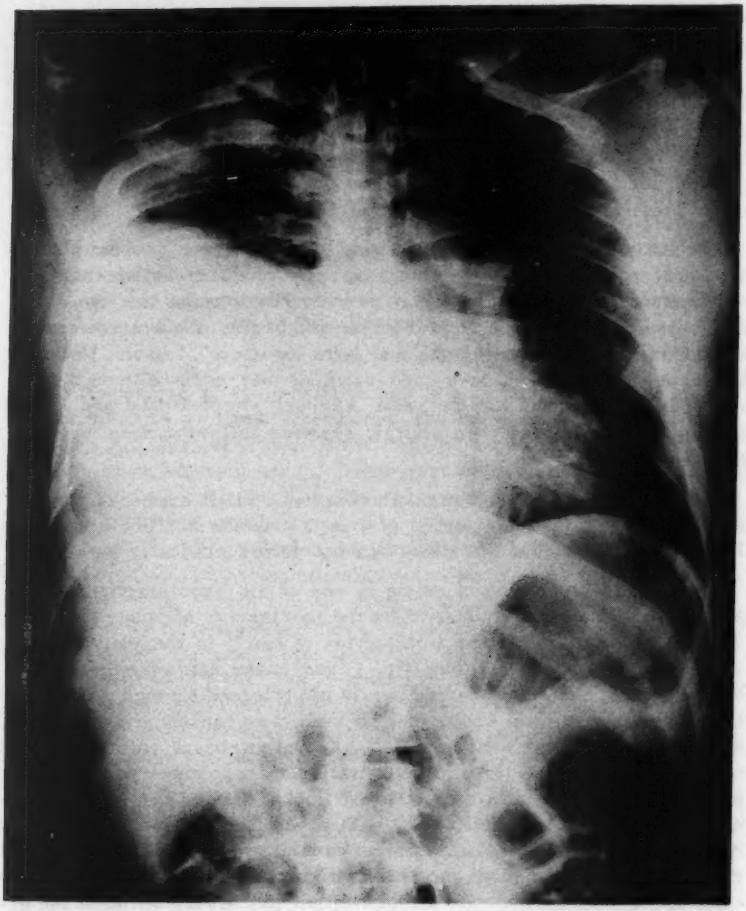

Figure 1. Mediastinum displaced to the left by accumulation of fluid after injection of streptokinase and streptodornase.

Initial aspiration of thin sanguineous fluid is not a contraindication to the use of streptokinase and streptodornase. The fluid frequently represents only the liquid component of the hemothorax while clotted blood, fibrin, and pus cover the walls of the pocket.

The chemotherapeutic and/or the antibiotic agents should be given orally or parenterally before the results of culture of the aspirated fluid are known because all traumatic hemothoraxes are potentially or actually infected. The chosen agent may be changed when the result of the culture is learned.

Twelve patients (table 1) with hemothorax have been treated with streptokinase and streptodornase. The results of treatment were excellent in all. In 11 patients in whom the date of injury was known, treatment was started on the average of slightly more than 8 days after injury. In 3 patients the interval was longer, 1 having gone as long as 26 days. Evidence of a slight pleural thickening or a small amount of fluid in the pleural cavity was found on the roentgenogram of each patient at the time of discharge. Such residuums have usually disappeared during the succeeding months as in the patient to be reported. The following instance (patient 6 in table 1) is illustrative of the treatment given.

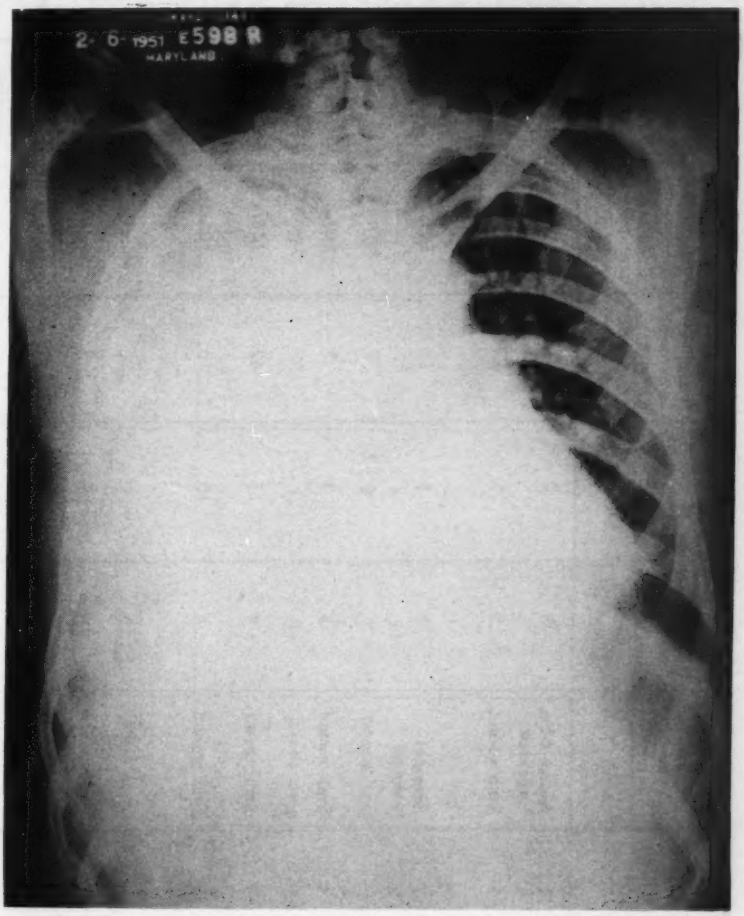

Figure 2. Roentgenogram of chest on 6 February.

TABLE 1. *Results of treatment with streptokinase and streptodornase in 12 patients with hemothorax*

Patient	Type of injury	Days before treatment with SK and SD	Number of treatments with SK and SD	Duration of treatment with SK and SD (days)	Highest temperature during treatment (° F)	Culture	Roentgenogram at discharge	Number of days from beginning of treatment with SK and SD to discharge
1	Automobile accident	8	2	4	103.4	Sterile	Slight thickening of pleura	29
2	Stab wound	5	5	12	102.4	Sterile	Marked clouding at base of left lung	30
3	Surgical wound	2	5	13	101.2	Sterile	Thickening of pleura and slight amount of fluid	19
4	Stab wound	3	5	7	103.2	Sterile	Moderate pleural reaction	43
5	Stab wound	4	13	42	104.4	Sterile	Slight pleural reaction	43
6	Stab wound	4	10	10	104.2	Unidentified clostridium species	Slight thickening of pleura	33
7	Automobile accident	26	8	8	103.0	Sterile	Slight effusion	34
8	Gunshot wound	3	15	26	104.0	Pseudomonas species	Slight effusion	68

TABLE 1. *Results of treatment with streptokinase and streptodornase in 12 patients with hemothorax*—Continued

Patient	Type of injury	Days before treatment with SK and SD	Number of treatments with SK and SD	Duration of treatment with SK and SD (days)	Highest temperature during treatment (° F)	Culture	Roentgenogram at discharge	Number of days from beginning of treatment with SK and SD to discharge
9	Undetermined	-	13	33	101.8	*Staphylococcus aureus*	Slight effusion	40
10	Stab wound	18	15	20	104.8	Sterile	Slight pleural thickening or effusion	29
11	Stab wound	2	4	4	103.4	Not made	Slight effusion	13
12	Surgical wound	15	5	11	101.0	*Pseudomonas aeruginosa, Aerobacter aerogenes* and gamma streptococcus	Slight pleural thickening	24

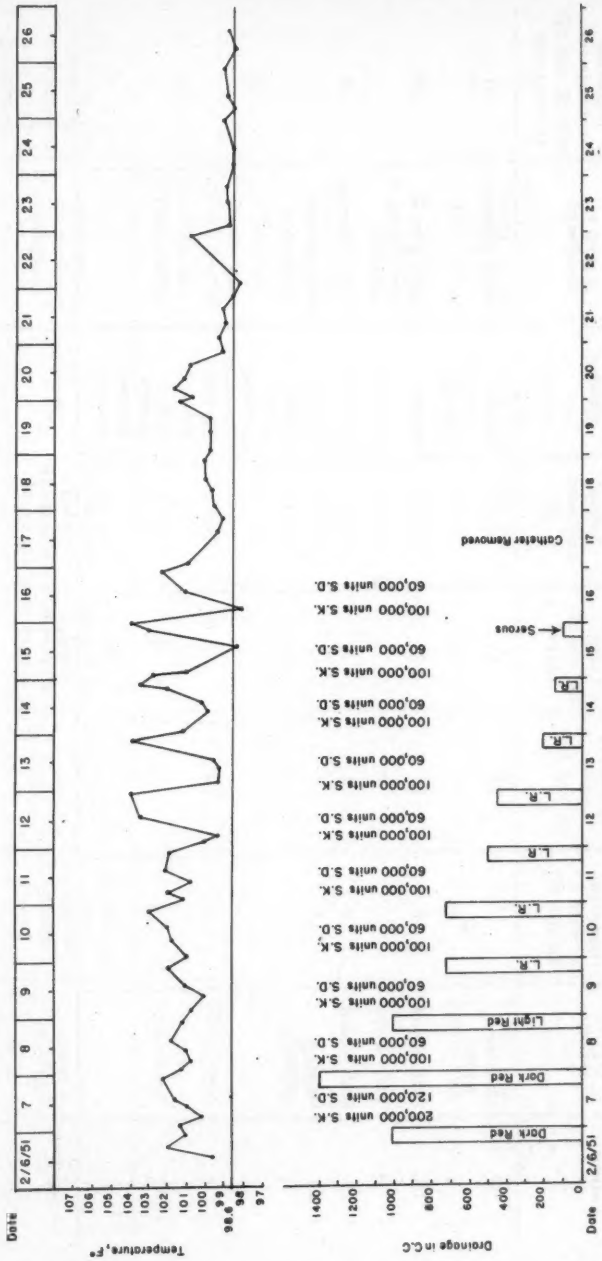

Figure 3. Details of treatment with streptokinase and streptodornase.

Figure 4. Roentgenogram of chest on 9 February showing some resolution. Figure 5. Roentgenogram of chest on 6 March showing continued resolution.

CASE REPORT

A 32-year-old Negro received 3 stab wounds of the right side of the chest on 2 February 1951. The wounds were sutured at another hospital on the day of injury but the patient was not hospitalized. Increasing dyspnea led to the return of the patient and aspiration of 1,500 cc. of blood on 5 February. Culture of the fluid obtained at this aspiration showed a *Clostridium welchii.* The patient was admitted to this hospital on 6 February, at which time a roentgenogram of the chest showed a large hemothorax on the right side (fig. 2). Closed drainage with suction through the eight interspace in the posterior axillary line was instituted on the day of admission. One thousand cubic centimeters of dark blood was aspirated in the first 24 hours; 300,000 units of aqueous crystalline procaine penicillin G were given intramuscularly twice a day from 6 to 9 February, following which the same dose was given t. i. d. until 9 March. Two hundred and fifty milligrams of aureomycin were given orally every 4 hours from 9 to 12 February. Streptokinase and streptodornase were administered as shown in figure 3. Culture of the fluid removed from the pleural cavity on 6 and 9 February showed an unidentified clostridium. The roentgenogram of the chest on 9 February (fig. 4) showed improvement and although opacity was still noted on 6 March (fig. 5), the patient was discharged on 9 March. A roentgenogram taken on 30 March showed further clearing of the base of the right lung. On 30 July the right lung was clear although the diaphragm was slightly elevated.

COMMENT

Although the experience summarized in this report has been gained entirely in the treatment of traumatic hemothorax in patients injured in civil life, the method is applicable to the treatment of battle casualties. In a study of 57 casualties who had a clotted hemothorax, Sommer and Mills *(10)* found that an average of 27.9 days elapsed between wounding and arrival at a thoracic center where definitive treatment was undertaken. Because organization of a hemothorax may be well advanced within 1 week of wounding *(8)* treatment must be undertaken early. Closed intercostal drainage is a simple procedure, requires but few instruments, and is readily accomplished under local anesthesia. Furthermore, these patients can be safely transported by air. We believe that this method of treating hemothorax should be used in caring for battle casualties, and that the treatment should be begun in the forward areas, without incurring the delay incident to evacuation.

SUMMARY

Twelve patients with traumatic hemothorax were treated early with intercostal closed catheter drainage and intrapleural injections of streptokinase and streptodornase. The results were excellent and illustrate importance of early treatment. This method is applicable to battle casualties.

(10) Sommer, G. N. J., Jr., and Mills, W. O.: Hemothorax and empyema in thoracic center. J. Thoracic Surg. 16: 154-178, Apr. 1947.

An Educational Program for Expectant and New Mothers

Robert D. Arnold, *Captain, U. S. A. F. (MC)* (1)

Irving H. Rozenfeld, *First Lieutenant, U. S. A. F. (MC)* (1)

THERE has been an increasing interest in prenatal educational programs as a result of the theories and practices advocated by Read (2). He believed that with proper indoctrination of the prenatal patient and with an understanding of the "fear-tension-pain syndrome" together with proper methods of relaxation, the patient can be helped to deliver her baby "naturally." Thoms (3) expanded this program by including emotional support during labor by the use of specially trained nurses and a rooming-in plan for babies. One of us (IHR) has been associated with a program of pre- and post-natal education at the Chicago Lying-in Hospital. Because of our interest in these programs, and because of our inability to give unlimited time to each patient, we decided to establish a program which would meet our needs at this hospital.

DESCRIPTION

The program consists of prenatal lectures, prenatal exercise classes, emotional support during labor, rooming-in, and postnatal pediatric lectures. During the prenatal period 3 lectures are given for the patients and their husbands. The *first* deals with the anatomy and physiology of pregnancy. The *second* discusses the anatomy and physiology of labor. The lecture material is supplemented by diagrams and charts obtained from the Maternity Center Association (4). In addition to this, the patients are instructed in detail about our hospital routine so that all procedures will be familiar to them on their admission. The *third* lecture deals with the physical and emotional growth and development of the child. The advantages of breast feeding are stressed.

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(1) U. S. Air Force Hospital, Tinker Air Force Base, Oklahoma City, Okla.

(2) Read, G. D.: Childbirth Without Fear: The Principles and Practice of Natural Childbirth. Harper & Brothers, New York, N. Y., 1944.

(3) Thoms, H.: Training for Childbirth: A Program of Natural Childbirth With Rooming-in. McGraw-Hill Book Co., Inc., New York, N. Y., 1950.

(4) The Birth Atlas: Maternity Center Association, New York, N. Y.

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In the two exercise classes, conducted by the chief obstetrical nurse, the patients are taught (1) exercises designed to increase the tone and control of the back, abdominal, and perineal muscles, (2) proper breathing, and (3) relaxing. These exercises are patterned after those described by Heardman *(5)*. At the end of the first exercise class, the patients are conducted through the maternity ward so that they will be familiar with the surroundings.

When the patient is admitted in labor, her husband is encouraged to remain at her side. A trained nurse is in constant attendance to reassure the patient as to the progress of her labor and to help her use the methods of relaxation which she has learned. Analgesia is given if requested. The patient is encouraged to have saddle block anesthesia for delivery so that fetal depression will be minimal and so she may see her baby as soon as it is delivered. The saddle block is used only as a terminal anesthetic and not as an analgesic agent.

For the first 12 hours following delivery the baby is kept in the nursery. After this it is placed in a crib at the mother's bedside where she can watch, play with, change, and feed the baby as necessary. This is an ideal time for the new mother to learn under supervision how to care for her infant properly. She is again encouraged to nurse her baby and is instructed in proper nursing technic. This rooming-in arrangement is also compatible with demand feeding, which we advocate. The baby is returned to the nursery each evening at 2200 hours where it remains until 0600 the following morning except for the 0200 feeding.

During hospitalization the mothers as a group again meet with the pediatrician to bring up such questions as they may have. Those problems which most commonly arise during the first 6 weeks of life are also discussed.

RESULTS

The immediate result of this program was a marked reduction in the number of phone calls concerning problems of the pre- and post-natal periods. Of greater significance are the results shown in table 1. A series of 100 consecutive patients who were delivered vaginally before the program was started (group 1) is compared with a similar series of patients who were delivered after the program was initiated (group 2). All of the patients in these 2 groups were delivered by one of us (RDA) and the criteria for giving analgesia were the same in both series. There was about the same number of primigravidas in both groups. The babies born to both groups of mothers enjoyed the advantages of rooming-in. Under the program there was a marked reduction in the percent of

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(5) Heardman, H.: A Way to Natural Childbirth. The Williams & Wilkins Co., Baltimore, Md., 1948. pp. 8-28.

TABLE 1. *Comparison of results of 3 series of vaginal deliveries before and after establishing the program (percent)*

Group	Demerol*			Awake during delivery	In labor less than 10 hours**	Depressed babies	Episiotomy	Forceps		Breech delivery
	None	50 mg.	More than 50 mg.					Low	Mid	
1	13	3	84	35	56	5	79	63	3	3
2	21	63	16	74	71	0	80	69	3	3
3	42	52	6	70	82	2***	72	78	2	2

*Given with 0.4 mg. of scopolamine.
**The onset of labor was taken as the time when the patient started to have regular contractions.
***This baby was delivered precipitately by a mother who had no analgesia or anesthesia.

patients who required more than 50 mg. of demerol and a marked increase in the percent of those who were awake during delivery. No depressed babies were born to the mothers in group 2.

DISCUSSION

Many of the benefits observed by this program cannot be statistically analyzed. It is difficult to evaluate the increased calmness and assurance with which the patient awaits labor, the reduction of fear and tension during labor, and the increased aptness and security with which she cares for her baby. It is certainly our clinical impression that all these have occurred. Our statistical results may be a little misleading because many of the patients in group 1 were instructed on an individual basis and received the benefits of this kind of program while about 40 percent of those in group 2 did not attend the group educational program.

We believe that our results would be even more impressive if there were a sharper distinction between these 2 groups. To confirm this belief we analyzed a third group of 50 patients who were delivered during the fourth month of the program. These patients (group 3) thus had the opportunity to become more thoroughly acquainted with the program than did those in group 2.

In group 3 there was a marked increase in the percent requiring no analgesia and a marked decrease in the percent requiring more than 50 mg. of demerol. This group showed a further increase in the percent who were in labor for less than 10 hours.

SUMMARY

An educational program for expectant and new mothers is practical for use in a military hospital. This type of program is desired and appreciated by the patients. The results of this program were: (1) emotional satisfaction of the mother in being allowed to participate in her labor and delivery; (2) elimination of depressed babies; (3) reduction in required analgesia; and (4) shorter duration of labor.

Experiences With Gastric Resection for Peptic Ulcer

Joseph P. Cannon, *M. D.* (1)

DURING the period from 1946 to 1951, about 1,800 patients with symptomatic gastric and duodenal ulcers were admitted to the medical service at this hospital. One hundred and fifty of these (8.3 percent) were subsequently transferred to the surgical service for subtotal gastric resection. All had medical treatment prior to surgical intervention. Eighty-five percent of them were considered to be good operative risks, and showed no evidence of metabolic or physical debility so often present in the ulcer patient, particularly when obstruction has been present. Indications for subtotal gastric resection at this hospital have been (1) intractable obstruction, (2) repeated or exsanguinating hemorrhage, (3) recurrences of ulcer in spite of education or medical regimen, (4) gastric ulcers which fail to respond adequately to strict medical therapy within 3 weeks or are otherwise suspected of malignancy, and (5) recurrent perforations (table 1).

The choice of treatment of the actively bleeding duodenal ulcer has engendered great controversy. In this series, 40 patients (26.7 percent) were operated on after they had ceased bleeding and been adequately controlled by medical means, thus minimizing the operative mortality. Only 4 (2.66 percent) were operated on while they were actively bleeding. One of these failed to respond to the usual heavy barbiturate sedation, transfusions, oral feedings, belladonna, and antacids (2). Because (1) he had O-type Rh-negative blood and our reserve in the blood bank was low and (2) he was apprehensive, operation was decided on. The second patient was a 44-year-old man who had been hospitalized twice previously in this institution. On his first admission he had a massive hematemesis which responded to medical therapy. He refused operation only to return about 9 months later with a recurrence of the ulcer. He again refused operation. On his third admission he had a massive hematemesis and was again treated medically. After

(1) Veterans Administration Medical Teaching Group, Kennedy Hospital, Memphis, Tenn.

(2) Bowers, R. F., and Rossett, N. E.: Bleeding peptic ulcer; favorable results by conservative treatment. Ann. Surg. 132: 690-701, Oct. 1950.

TABLE 1. *Preoperative diagnosis*

Obstruction	
Obstruction only	44
Obstruction with hemorrhage	5
Obstruction with hemorrhage and 1 perforation	1
Obstruction with intractable pain	1
Obstruction with 1 previous perforation	9
Obstruction with 2 previous perforations	1
Obstruction with 3 previous perforations	1
Obstruction with nonfunctioning gastroenterostomy with 2 previous perforations	1
Obstruction with intractable pain and gastroenterostomy	1
Obstruction with 1 perforation and previous gastroenterostomy	2
Obstruction with nonfunctioning gastroenterostomy	1
Obstruction with gastric diverticulum	1
Obstruction with duodenal and gastric ulcer	1
Hemorrhage	
Hemorrhage only	24
Hemorrhage, acute	3
Hemorrhage with intractable pain	1
Hemorrhage with 1 previous perforation	5
Hemorrhage with 2 previous perforations	1
Intractable pain	
Intractable pain only	19
Intractable pain with 1 perforation	5
Intractable pain with 2 perforations	2
Possible carcinoma	
Gastric ulcer	10
Gastric ulcer with acute hemorrhage	1
Gastric ulcer with recurrent hemorrhage	1
Gastric ulcer with obstruction	5
Gastric ulcer with obstruction and perforation	1
Gastric ulcer with obstruction and hemorrhage	1
Gastric ulcer with 1 previous perforation	1
Perforation, acute	1
Total	150

24 hours there was a sudden change in his clinical findings and it was suspected that he might have a perforation. He was transferred to the surgical service, and an emergency subtotal gastric resection was performed. The third patient was a 31-year-old man who was admitted in shock after a massive hematemesis. His bleeding ceased after 24 hours but it recurred at the end of 48 hours. This was checked but 24 hours later he had a massive hematemesis. Further conservative treatment was not indicated and the patient underwent a subtotal gastric resection. The fourth patient is discussed in detail below. When the duodenum was exposed, in these patients, bleeding had ceased although ulceration was present. The Hofmeister type of subtotal resection with removal of the ulcers was performed on these patients. There was no evidence of postoperative hemorrhage.

Current literature shows a wide divergence of reported mortality (3-9) as well as sharply varying opinions regarding the most advantageous time for surgical intervention in patients with gastroduodenal bleeding (10-16). Efforts are being made by many observers to minimize the importance of clinical judgment, stressing reliance on laboratory criteria (17). At the other extreme is a group which advocates operation immediately on admission or as soon as possible in all patients with

(3) Chiesman, W. E.: Mortality of severe hemorrhage from peptic ulcers. Lancet 2: 722-723, Oct. 1, 1932.

(4) Hinton, J. W.: Surgical treatment for massive hemorrhage in peptic ulcer. S. Clin. North America 18: 539-547, Apr. 1938.

(5) Jankelson, I. R., and Segal, M. S.: Massive hemorrhage from peptic ulcer. New England J. Med. 219: 3-5, July 7, 1938.

(6) Welch, C. E.: Treatment of acute, massive gastroduodenal hemorrhage. J. A. M. A. 141: 1113-1119, Dec. 17, 1949.

(7) Levy, A. H. (New York): Partial gastrectomy for peptic ulcer with particular reference to pyloric antrum. Ann. Surg. 131: 330-341, Mar. 1950.

(8) Blackford, J. M., and Williams, R. H.: Fatal hemorrhage from peptic ulcer; 116 cases collected from vital statistics of Seattle during years 1935-1939 inclusive. J. A. M. A. 115: 1774-1776, Nov. 23, 1940.

(9) Colp, R.: Surgical management of duodenal ulcer. Surg., Gynec. & Obst. 91: 306-310, Sept. 1950.

(10) Heuer, G. J.: Surgical aspects of hemorrhage from peptic ulcer. New England J. Med. 235: 777-783, Nov. 28, 1946.

(11) Holman, C. W.: Further observations on treatment of bleeding peptic ulcer. Surgery 23: 405-410, Mar. 1948.

(12) Stewart, J. D.; Schaer, S. M.; Potter, W. H.; and Massover, A. J.: Management of massively bleeding peptic ulcer. Ann. Surg. 128: 791-802, Oct. 1948.

(13) Wangensteen, O. H.: Problem of surgical arrest of massive hemorrhage in duodenal ulcer; technique of closing duodenum. Surgery 8: 275-288, Aug. 1940.

(14) Allen, A. W.: Surgical treatment of duodenal ulcer. Arch. Surg. 44: 501-519, Mar. 1942.

(15) Allen, A. W., and Benedict, E. B.: Acute massive hemorrhage from duodenal ulcer. Ann. Surg. 98: 736-749, Oct. 1933.

(16) Finsterer, H.: Surgical treatment of acute profuse gastric hemorrhages. Surg., Gynec. & Obst. 69: 291-298, Sept. 1939.

(17) Dunphy, J. E., and Hoerr, S. O.: Indication for emergency operation in severe hemorrhage from gastric or duodenal ulcer. Surgery 24: 231-238, Aug. 1948.

massive or acute gastroduodenal hemorrhage (18). Some credence should be given to each method. Laboratory data cannot be entirely discounted as an index to the general condition of the patient, but it must always defer to the judgment of the experienced physician and surgeon. There is, however, general agreement that if an operation is to be performed, it should be done during the first 48 hours of the hemorrhage whenever possible (16).

TABLE 2. *Age distribution*

Age (years)	*Number of patients*
21 - 30	39
31 - 40	41
41 - 50	12
51 - 60	50
61 - 70	8
Total	150

In this type of operation, as in all others, mortality increases in direct proportion to age. The average age in this series was 40.9 years (table 2). The average duration of symptoms was 8.3 years (range 3 weeks to 31 years). By apparent coincidence the onset of symptoms in the average patient corresponded to his induction into the service.

The economic, social, and occupational levels of the patients are of some significance. A large percent of these patients came from rural areas. Twenty-nine percent were farmers, mainly small farm owners or tenant farmers. Although they were not subject to the same type of social and survival stresses found in urban communities, they were in competition with estate farms and were further beset by the problems of a one-time agricultural area making a rapid swing to industry. The largest single group (30 percent) was comprised of tradesmen and skilled craftsmen. They were faced with the keenest job competition and had, in addition, the economic difficulties arising from city living. Although the professional group is usually represented in larger numbers in series of ulcer patients, those from this group numbered only 20 percent and were in proportion to the total admissions of this group to this hospital. The remaining 21 percent were laborers. They had the least tension resulting from job responsibility.

This study includes the work of many members of the staff, but only 2 technics were used. The classical retrocolic Hofmeister procedure was used in 134 of the patients and resections with anticolic

(18) Stewart, J. D.; Rudman, I.; Citret, C.; and Hale, H. W., Jr.: Definitive treatment of bleeding peptic ulcer. Ann. Surg. 132: 681-689, Oct. 1950.

anastomoses were performed on the rest. Total removal of the ulcer was accomplished in 137 patients; partial removal in 5; and technical difficulties prevented the removal of the ulcers in 8. In 2 patients the common bile duct and the pancreatic duct were inadvertently severed. In both patients the duodenum was closed in the usual manner. A classical Hofmeister anastomosis between the jejunum and the stomach was performed. About 18 inches below the ligament of Treitz the jejunum was severed and an anastomosis of the distal end of the jejunum to the common bile duct and pancreatic duct, posterior to the transverse colon, was performed using Roux's gastroenterostomy en "Y" technic. The proximal end of the jejunum was closed and a side-to-side anastomosis of the jejunum was then constructed. Both of these patients made an uneventful recovery and the T-tube which had previously been inserted into the common duct was removed 3 months postoperatively. Although right rectus, left rectus, and transverse incisions were used in this series, a midline incision is currently preferred for this procedure owing to (1) the relative absence of vascularity in this region, (2) the ease of opening and closing, and (3) better exposure. Peritoneal and fascial layers were closed with catgut to avoid the occurrence of abscesses around the silk sutures.

The prime objective of this type of operation is the removal of most of the acid-forming portion of the stomach. Although vagotomy is useful, if technically feasible, to help obviate recurrence of hemorrhage, it is not a routine part of the procedure but is considered to be an adjunct and was used in 63 of the patients in this series.

A great deal of care was taken with each patient in preoperative preparation. After he was transferred to the surgical service, he was again completely re-evaluated from the surgical viewpoint. A complete blood count; urinalysis; total protein, albumin, globulin, nonprotein nitrogen, and blood chloride determinations; and potassium estimation in patients with continued obstruction were obtained. If there was any abnormality or deficit, immediate corrective therapy was instituted prior to operation. The basic principles of the medical service were also carried out. Adequate amounts of antacids and bland foods were given orally. If the patient had an obstruction, gastric lavage was performed twice daily (*19*). Decompression by means of a Levin tube was accomplished in most patients for at least 12 hours prior to operation. The colon was cleansed by means of enemas the night before operation as it was our experience that the antacids have a constipating effect. Routinely our patients received one of the barbiturates the night before operation and morphine and atropine 90 minutes prior to being taken to the operating room.

General anesthesia with intratracheal intubation was used in all patients. This gave our anesthetists complete control over the patient during the operation. As a rule, small amounts of pentothal sodium

(*19*) Rossett, N. E., et al: Peptic ulcer; medical cure by efficient gastric acid neutralization. To be published.

were given intravenously in order to minimize the excitement stage of the anesthetic. The patient was then carried on cyclopropane or ether, depending on his individual need. The surgeon was informed frequently of the patient's blood pressure, pulse, and respirations. If any abnormal reaction occurred during the course of the anesthesia, the surgeon was notified immediately. Curare was used intravenously in order to allow complete relaxation and subsequent ease for the surgeon. Blood loss was kept to a minimum. Most subtotal gastric resections were performed by the senior resident staff but complicated cases such as patients with acutely bleeding duodenal ulcer or multiple perforations, were handled by the senior staff.

TABLE 3. *Postoperative complications*

Phlebothrombosis	3
Dehiscence	2
Obstruction requiring surgical intervention	2
Common duct entered	2
Hemorrhage	2
Common duct severed, pancreaticojejunostomy and choledochojejunostomy using Roux's gastrojejunostomy en "Y" technic	2
Subphrenic abscess	1
Pelvic abscess	1
Abscesses in right upper and left lower abdominal quadrants	1
Atelectasis	1
Total	17

Postoperative complications of varying severity developed in 17 patients as shown in table 3. Patients with subphrenic and pelvic abscesses were treated conservatively with penicillin and the infections resolved without difficulty. In the patient with right upper and left lower abdominal quadrant abscesses, surgical drainage was employed with subsequent recovery. Dehiscence occurred in 1 patient on the fourth and in 1 patient on the tenth postoperative days. Secondary closure was successful. The obstruction in 1 patient proved, on exploration, to be mechanical; the suture of the mesocolon had slipped with resultant constriction of the jejunum. The obstruction in another patient was due to a suture which had severed the posterior wall of the anastomosis and had partly occluded this opening. These 2 patients made uneventful recoveries. Both patients in whom the common bile duct was entered had obstruction. One had had a previous closure of a duodenal perforation 6 years earlier which added to the technical difficulties of the surgeon. In both patients a T-tube was placed in the common bile duct but they both developed a pan-

creatic fistula which drained for 28 and 30 days respectively. Phlebothrombosis occurred in 3 patients, developing on the fourth, seventh, and tenth postoperative days. The first 2 of these were treated by immediate bilateral superficial femoral vein ligation; the third was treated with anticoagulants for 9 days before ligation. Only 1 patient developed atelectasis which was treated immediately without difficulty.

Two patients had postoperative hemorrhages, starting immediately after operation and lasting 36 and 72 hours. The onset of hemorrhage seemed to indicate either incomplete hemostasis or a technical error in the gastrojejunal suture line. One patient had had a duodenal hemorrhage 100 days prior to operation and the other had obstruction. In both, the ulcer was completely removed. Both were treated conservatively with transfusions and did not require further operation. Three patients with superficial wound infections were not included in table 3. None of the patients in this series had a duodenal stump blowout except 1 whose case report is given below. About 20 percent of the gastric resections became mildly obstructed between the eighth and fourteenth postoperative days. Treatment consisted of passing a Levin tube with Wangensteen suction for 48 hours. Following this, the amount of fluids given the patient orally were restricted and all the patients but 2 made uneventful recoveries. In 11 patients additional surgical procedures (7 appendectomies, 2 splenectomies, 1 cholecystectomy, and 1 combination splenectomy and cholecystectomy) were accomplished at the time of resection.

Postoperatively all patients were decompressed with Levin tube and Wangensteen suction. Penicillin was given intramuscularly to prevent infection and parenteral fluids were used to maintain electrolytic balance. When indicated and if possible, blood was given after the patient regained consciousness in order to minimize the occurrence of a transfusion reaction. When postoperative peristalsis was definitely established (in from 48 to 72 hours), the Levin tube was removed and fluids were given by mouth in gradually increasing amounts. Patients were allowed to walk on the first postoperative day.

Skin sutures were usually removed on the seventh postoperative day and the patients were kept on the surgical service for an additional week until they were able to tolerate a convalescent ulcer diet without difficulty and to observe any postoperative complications. At the end of that time, the patient was transferred to the medical service. A gastrointestinal series was performed on each patient prior to discharge. He attended a series of group classes covering his postoperative dietary regimen early in his postoperative course. He was advised to return to the hospital after 3 months for a checkup. One hundred and forty-two of these patients showed well-functioning posterior gastroenterostomies; 2 showed dilatation of the afferent loop with slow progress; 1 showed mild obstruction at the stoma but was clini-

cally asymptomatic; and in 1 a narrow stoma was visualized. Sixty-two of the 63 who had a vagotomy were checked postoperatively with the histamine test and were found to have achlorhydria.

There were 4 deaths in this series. These patients are described below.

CASE REPORTS

Case 1. A 45-year-old alcoholic, diabetic laborer with a 4-year known history of ulcer was explored 6 hours after a second perforation of a duodenal ulcer. The first perforation had been repaired 4 years previously. The second perforation involved most of the duodenum and in spite of the patient's generally debilitated condition, an ill-advised subtotal resection was performed. Chemotherapy was ineffective during a septic postoperative course and the patient died on the fifth postoperative day. An autopsy showed a perforation of the duodenal stump and transverse colon secondary to gangrene with a resulting generalized peritonitis. A right subphrenic abscess as well as bilateral early fibropurulent pleuritis and early fibropurulent pericarditis were also noted. The middle colic artery had been interruped during the operation.

Case 2. A 55-year-old man with arrested pulmonary tuberculosis and a history of recurrent obstruction and hemorrhage from a gastric ulcer of 30 years' duration was admitted with gross hematemesis which was brought under control after several weeks of medical treatment. Leaving the hospital against medical advice, he returned in 1 month with slight hemorrhage and marked obstruction. Operation revealed a huge fibrosed stomach with an ulcer 2 cm. in diameter on the posterior wall. The ulcer had eroded into the pancreas. A subtotal resection was performed and 24 hours postoperatively, the patient pulled out the Levin tube which could not be reinserted. Distention and peritonitis developed. A jejunostomy was performed on the sixth postoperative day, but the patient died 2 days later. An autopsy showed generalized peritonitis, acute glomerulonephritis, and bilateral pulmonary congestion and atelectasis.

Case 3. A 65-year-old diabetic with known renal dysfunction and a history of duodenal ulcer of 2 years' duration was admitted with a partial obstruction. After adequate medical treatment, a subtotal gastric resection was performed. The patient developed a right subhepatic abscess, had a stormy and septic postoperative course complicated by a transfusion reaction, and died on the tenth postoperative day. An autopsy showed peritonitis, pancreatic fistula, bilateral pulmonary edema, bilateral focal atelectasis, and bilateral nephrosclerosis.

Case 4. A 51-year-old man with a history of ulcer of 20 years' duration was admitted with marked obstruction. A subtotal resection was performed. The patient received 3,000 cc. of blood during and after operation. Peritonitis developed and chemotherapy was unsuccessful.

He died on the twelfth postoperative day. Autopsy showed necrosis of the stomach wall with the anastomosis intact.

CONCLUSION

Subtotal gastric resection can be performed with a minimum of risk when there is close cooperation between the surgical and medical services. Our mortality was 2.66 percent of the first 150 cases of subtotal gastric resection for duodenal and gastric ulcer.

BOOK REVIEWS

Causalgia, by *Frank H. Mayfield,* M. D., Assistant Professor of Clinical Surgery, College of Medicine, University of Cincinnati; Attending Neurological Surgeon, Bethesda Hospital, Christ Hospital, Deaconess Hospital, Good Samaritan Hospital, St. Francis Hospital, and Jewish Hospital, Cincinnati, Ohio. Publication Number 58, American Lecture Series. A Monograph in American Lectures in Neurosurgery. Edited by *Michael E. De Bakey,* M. D., Professor of Surgery and Head of the Department of Surgery, Baylor University College of Medicine, Houston, Tex., and *R. Glan Spurling,* M. D., Clinical Professor of Surgery, University of Louisville, Louisville, Ky. Neurosurgical Division edited by *Barnes Woodhall,* M. D., Professor of Neurosurgery, Duke Hospital and School of Medicine, Durham, N. C. 65 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

This small monograph presents the clinical experience of Doctor Mayfield in the study, diagnosis, and treatment of causalgia. The data of 105 patients with true causalgia seen in military service and a lesser untabulated number seen in civilian practice form the basis of the study. A brief history of causalgia beginning with Weir Mitchell's introduction of the term is given. There are discussions of the incidence, symptoms and signs, differential diagnosis, pathology, and treatment. Detailed technics for sympathetic blocks and surgical sympathectomy of the arm and leg are described. After presenting the end results, causative mechanisms are discussed. The book is well illustrated and easy to read. The material is concisely presented with suitable references appended. The author concludes that surgical interruption of the sympathetic chain is the treatment of choice and that failures are due to incomplete sympathectomy, perhaps explained by anomalous innervation of the leg, or inadvertent removal of the wrong rib where an arm was involved. Blocking agents in the author's experience have given only temporary relief. He further advises sympathectomy early before the psychic trauma and disuse of the limb have crippled the patient. The book is an excellent summary of the subject for physicians who are called on to treat injured patients.

—*Lt. Col. R. C. Greenwood, MC, U. S. A.*

Doctors Differ, Five Studies in Contrast: John Elliotson, Hugh Owen Thomas, James Mackenzie, William Macewen, and R. W. Philip, by *Harley Williams.* 239 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $5.50.

This book contains biographical studies of a number of physicians. They include such dissimilar figures as John Elliotson, an early nineteenth century student of mesmerism, and Edward Trudeau who established the Lake Saranac hospital for the treatment of tuberculosis. One of the most interesting of the sketches is that of Hugh Owen Thomas, one of the pioneers in orthopedic surgery. Others described are James Mackenzie, the cardiologist, and the surgeons, Victor Horsley and William Macewen. The book is written more for the layman than for the physician and the dramatic features of his subject are emphasized by the author. Though the book contains a number of statements with which a doctor would differ, it is interesting to read and draws attention to some of our great medical pioneers. The printing and illustrations are excellent. The picture of James Mackenzie is a splendid example of the photographer's art. Such a portrait might well adorn the office of every cardiologist.—*Capt. L. H. Roddis, MC, U. S. N.* (Ret.)

An Atlas of General Affections of the Skeleton, by *Sir Thomas Fairbank,* D. S. O., O. B. E., M. S., Hon. M. Ch. (Orth.), F. R. C. S., Consulting Orthopaedic Surgeon and Emeritus Lecturer in Orthopaedic Surgery, King's College Hospital; Consulting Surgeon, Hospital for Sick Children, Great Ormond Street; Emeritus Consulting Surgeon, Lord Mayor Treloar Orthopaedic Hospital, Alton; Honorary Consultant (Orthopaedic) to the Army. 411 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1951.

This book was compiled to assist doctors in diagnosing general affections of the skeleton which the author classifies according to their cause, such as (1) congenital developmental errors, (2) acquired affections of unknown origin, (3) those due to errors of diet and metabolism, (4) those due to endocrine errors, (5) those due to infection or toxemia, (6) those due to errors of hemopoietic and lymphatic systems, and (7) multiple neoplasms. In the introduction the blood chemistry in various affections of the skeleton is given in outline form. The author also lists various conditions in which certain outstanding features are encountered, such as dwarfism, increased density of bone, collapse of one or more vertebral bodies, and multiple fractures. Each condition is discussed as to the clinical features, clinical progress, pathologic findings, radiographic appearance, diagnosis, and other pertinent material. At the end of each chapter case histories are given with excellent photographs of these patients and their roentgenograms. This atlas is well written and should be a great help to orthopedists and radiologists in the diagnosis of affections of the skeleton for many of these conditions are seldom seen. The book does not discuss treatment. It is an excellent reference book for hospital libraries.—*Col. R. E. Reiner, MC, U. S. A.*

An Activity Program for Open-Ward Neuropsychiatric Patients

Peter F. Regan, III, *First Lieutenant, MC, A. U. S. (1)*
Howard C. Reid, *Captain, MC, A. U. S. (1)*
John D. Medwed, *Major, MSC, U. S. A. (1)*

AN effective activity program for open-ward neuropsychiatric patients has been initiated at this hospital. This program uses the facilities available at any general hospital of more than 400 beds. Experience has shown that such a program can be maintained with a minimum of trained personnel and limited equipment. The material presented is the result of experience on a 90-bed psychiatry and neurology service of a 750-bed Army hospital. The hospital treatment of psychiatric patients should keep them as close as possible to a normal life. This should include a balanced program of "work and recreation, rest and physical requirements" *(2)*. Ranson *(3)* emphasized the fact that this is especially true in the treatment of military psychiatric patients. If hospital life is allowed to become cloistered and too different from normal military environment there will be a decrease in the effectiveness of therapy and a reduction of number of patients returned to duty.

ACTIVITY PROGRAM

All patients on the open psychiatric wards of this hospital follow a planned program. They are expected to take part in the activities, unless excused by their physician. In practice, only those with intercurrent infections, or those having treatments, tests, or interviews, are excused. The program provides 3 hours of work and occupational therapy, 3 hours

(1) U. S. Army Hospital, Camp Chaffee, Ark.

(2) Diethelm, O.: Treatment in Psychiatry. 2d edition. Charles C Thomas, Publisher, Springfield, Ill., 1950.

(3) Ranson, S. W.: Psychiatric treatment in combat areas. U. S. Armed Forces M. J. 1: 1379-1397, Dec. 1950.

of physical reconditioning, and adequate nonphysical recreation each day. The daily schedule is as follows:

6:30 – 7:30 a. m.	– Breakfast
7:30 – 8:15 a. m.	– Ward details (cleaning, making beds, et cetera) under supervision of enlisted attendants
8:15 – 9:15 a. m.	– Ward rounds by physician
9:30 – 11:30 a. m.	– Occupational therapy
11:30 – 1:00 p. m.	– Dinner and rest period
1:00 – 4:00 p. m.	– Physical reconditioning
4:00 – 5:00 p. m.	– Rest period
5:00 – 6:00 p. m.	– Supper
6:00 – 9:00 p. m.	– Recreation (including Red Cross activities, movies, card games, et cetera)
9:00 – 6:00 a. m.	– Sleep

Occupational therapy program. When the psychiatric service was first organized, the available occupational therapy consisted only of the work involved in the physical care of the patients' wards. This activity was inadequate in scope and remains in the patients' current activity as only a small part of the total program. Because of the acute shortage of occupational therapists in the Army Medical Service, a regular occupational therapy program could not be established and it was necessary to devise some method of providing regulated, supervised, and productive activities for the patients.

Such a method was established by the Hospital Management Officer (JDM). The program described is authorized under Army Regulations (AR 40-610). The value of such a program is generally appreciated in the best psychiatric hospitals *(2)* but is not normally used in general hospitals. Patients are assigned to various occupations throughout the hospital. The medical officer in charge designates the type of work which each patient is capable of performing and is available to perform. A patient may, therefore, be (1) not available, (2) available for any work, or (3) available only for work of a particular nature. A mimeographed form is forwarded to the commanding officer of the detachment of patients daily by 1600 hours, listing the patients available for work on the following day.

At the same time, the various administrative and medical departments of the hospital submit to the detachment commander, on a second form, requests for patients, stating the number of patients they can use and the type of work to be done. When a department requests patients for work, it arranges for suitable supervision of this work. By 0915 hours on the next day, the detachment commander has correlated the requests and the availability lists. Patients report to the detachment

commander's office at 0915 daily for their assignments. On completion of assignments the patients are required to report back to the detachment office for further assignments or release.

In this program, the patients have helped in laboratories, acted as couriers and receptionists, planted gardens, cut grass, moved furniture, filed records, and performed various other tasks. For example, one patient may work as a technician in the dental laboratory, another as a clerk in the registrar's office, and a third may make electrical repairs throughout the hospital. All special talents are used for the most productive results. Patients are kept at one type of work as much as possible. Supervision that is at least adequate and frequently expert is maintained so that all patients have the satisfaction of productive work.

Aside from the relatively small amount of paper work involved, no difficulties with this program were encountered. Although more than 500 psychiatric patients, including many with paranoid schizophrenic reactions, have engaged in these activities, there were no serious disturbances. Not a single patient has opposed the program. The acceptance of the program by the hospital has been noteworthy, and the requests for patient-workers has been greater than the number of patients available. The program depends partly on military authority over the individual, for its execution. Just as important, however, is cooperation between the medical officer, the detachment commander, and the department requiring work to be accomplished. Frequent personal attention by the physician and the detachment commander and wholehearted cooperation by all in the hospital are essential.

Physical reconditioning program. This program is under the supervision of two enlisted physical reconditioning specialists. The daily program, from 1300 hours to 1600 hours, is conducted on the playing fields around the hospital, at the swimming pool, at the post gymnasium, and in an empty hospital ward adequately equipped as a gymnasium. Although calisthenics and special exercises are used selectively, the major emphasis is on group activities. All patients are required to be present during the afternoon program. They are not forced to take any active part, but will invariably enter into activities as they become interested. Patients who fear physical activity are made umpires or scorekeepers and soon find themselves doing more than they believed possible. Just as with the occupational therapy program, specific types of activities for individual patients are important. Here again, the personal attention of the physician, who is aware of the patient's condition, is essential.

CONCLUSIONS

A program of activities for open-ward psychiatric patients has contributed immeasurably in maintaining a short average hospitalization of 18.4 days per patient in this hospital (1951). Such a program can

easily be organized in any Armed Forces hospital of more than 400 beds. Various aspects of the program may be used in the treatment of medical and surgical patients, both with and without emotional disturbances. Such is the practice at this hospital. Apart from the therapeutic advantages of the entire program, the occupational therapy program performs a valuable service for the hospital by making available manpower which is ordinarily lost, thereby alleviating some of the problems due to shortages of assigned duty personnel, and increasing the effectiveness of the hospital.

BOOK REVIEW

Annual Review of Physiology, Volume 14, by *Victor E. Hall,* Editor, University of California School of Medicine, Los Angeles; *Jefferson M. Crismon,* Associate Editor, Stanford University; *Arthur C. Giese,* Associate Editor, Stanford University. 589 pages. Annual Reviews, Inc., and the American Physiological Society, Stanford, Calif., publisher, 1952. Price $6.

The 1952 volume of this Review is well organized and easily read. A chapter on the comparative physiology of invertebrate muscle is included. This is the first of a series of chapters on comparative physiology. Future volumes will undoubtedly contain additional information on this subject. This book summarizes the most important facts and theories which have been presented in the physiologic literature in the recent past. The authors of the various chapters are outstanding in their particular fields. Twenty-seven pages are devoted to water metabolism, including clinical correlations. The fundamentals of blood clotting are discussed specifically and at length. Of particular interest to clinicians is the thorough review of recent studies in cardiac physiology. The chapter on the kidney by Corcoran and others is concise and informative. Three chapters are devoted to the nervous system. There is a chapter on hearing. Conn and Fajans have written about the pituitary-adrenal system including correlation with other endocrine glands. This timely subject is of wide interest to physiologists and clinicians alike. A separate chapter on the thyroid gland summarizes the newer concepts in an effective and interesting manner. This book is worthy of perusal by all interested in physiology and clinical medicine. It is well edited and the subject matter is so written as to hold one's attention. Extensive bibliographies are given at the end of each chapter.—*Lt. Col. B. A. Nichol, MC, U. S. A.*

Dental Service in an Infantry Division

John E. Pleasants, *Lieutenant Colonel, DC, U. S. A.*

MANY dental officers (myself included prior to service with the 7th Infantry Division) who have not served with troops in the field hope they will never have such service. Those of us, however, who have had the experience of "running our practice" in the field, under combat conditions, have learned some valuable lessons. Even in this age of fast airplanes and guided missiles, the Korean conflict has proved once more that there is no substitute for the foot soldier; therefore, it behooves all of us to know something of the problems and difficulties encountered with field dentistry and how to overcome them.

Under the present infantry division table of organization the division dental section, composed of 18 dental officers and 20 enlisted men, is assigned to the division medical battalion. The equipment consists of 17 Chests No. 60; 1 dental prosthetic truck, 2½-ton 6 by 6 fully equipped; 1 cargo truck, 2½-ton 6 by 6 with 1-ton trailer; and 6 trucks, ¼-ton, more commonly called jeeps, with ¼-ton trailers (fig. 1). There are many other items on the table of equipment, such as tents, generators, et cetera, which will not be listed in detail. I believe that some changes should be made in the table of organization and equipment but we must work with what is authorized at present. The officer personnel consists of 1 major who is the division dental surgeon, 1 major who is the division prosthodontist, and 16 captains. The enlisted personnel consists of 1 master sergeant who is chief dental technician, 1 sergeant first class who is assistant dental technician, 2 sergeants and 1 corporal who are dental laboratory technicians, and 15 corporals who are assistant dental technicians. The division dental surgeon is a special staff officer and has no command function. He is responsible, however, for the functioning of the dental service and for all intent and purposes is in charge of the dental section. His duties and responsibilities are listed in AR 40-15, 20 March 1952.

During World War II, dental officers were assigned to individual units within the division. Under that system, dental officers were used for many duties other than dentistry and many man-hours were lost to the

service which could have been profitably spent maintaining and rehabilitating the dental health of the troops. With all dental personnel in one section, they can now be placed where dental service is needed at any given time. When a division is in garrison it is much more economical and convenient to have a centrally located dental clinic where all of the officers may work in a group. If the division is located on more than one post, as most are in occupation duty overseas, then they must be allocated or distributed evenly so that the most effective dental care may be rendered.

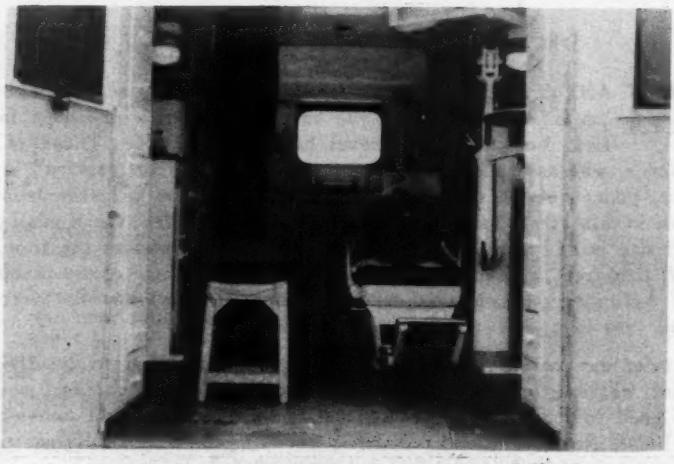

Figure 1. Interior view of dental operating truck No. 2.

The infantry battalion is the smallest fighting unit which has an aid station and a medical officer. There are 3 battalions in a regiment and 3 infantry regiments in a division. Each regiment has, in addition to the 3 battalions, 5 companies of special troops: a headquarters and headquarters company, a heavy mortar company, a service company, a tank company, and a medical company. All the medical personnel in the regiment are assigned to the medical company. The regimental collecting station is operated by the medical company. The division artillery is composed of a headquarters and three 105-mm. howitzer battalions, one 155-mm. howitzer battalion, and one antiaircraft battalion. Each battalion has an aid station plus an aid station at artillery headquarters. In addition to these fighting forces the infantry division has a combat engineer battalion, a medical battalion, an ordnance company, a quartermaster company, a reconnaissance company, a replacement company, and a division headquarters and headquarters company. The engineers and division headquarters have medical detachments with aid stations. The division medical battalion is composed of a headquarters and headquarters company, a clearing company, and an ambulance company. The headquarters and headquarters company has the personnel assigned for

operating the headquarters section, battalion supply section, communications sections, personnel section, division medical supply section, and division dental section. The clearing company is composed of a headquarters and 3 clearing platoons or stations. The ambulance company is composed of a headquarters and 3 ambulance platoons.

The medical chain of evacuation in an infantry division begins with the wounded soldier on the battlefield being treated by the company aid man. He is then transported by litter bearers to the battalion aid station, where he is seen by a medical officer. He is evacuated from the battalion aid station by litter jeep to a regimental collecting station. The medical battalion ambulances take him from the collecting station to the clearing station. The clearing station is the last link in the chain of medical evacuation within the division area. From clearing station he is evacuated to the rear by a corps ambulance to a mobile army surgical hospital or an evacuation hospital. In Korea evacuation by helicopter has also been used. The helicopter pilots have accomplished their mission in a superior manner and many a soldier living today owes his life to these men.

I was assigned to the 7th Infantry Division and the 7th Medical Battalion for more than 2 years, 11 months of which was with combat troops in Korea.

While on duty in Japan in July 1950 our division was alerted for movement. We entrained for our staging area early in August. After arrival at the staging area we were assigned 7 new dental officers, giving us at that time a total of 15. This was the first time since World War II that the division had that many dental officers and the first time they had all been together. We soon realized, however, that we could not stay together. The regiments of the division, up until then, had only 2 battalions, but were fast organizing and supplying their third battalions. Orders were issued placing 3 dental officers on detached service with each regiment, 2 with the division artillery. The others remained with the medical battalion. The division dental surgeon operated from battalion headquarters. The prosthodontist remained with the laboratory truck and 2 dental officers were placed with the clearing company of the medical battalion.

While still in our staging area in Japan we were fortunate in being able to secure 2 dental operating trucks. These trucks were not part of our normal equipment but had been secured originally by the 8th Army to serve as mobile dental clinics for the divisions on occupation duty in Japan while they were at their maneuver areas. Since the 7th Infantry Division was the only division not already in Korea, it was decided that *someone* should get *some* use of these wonderful trucks, so we added them to our equipment.

For the next 3 weeks all the dental officers were very busy. We conducted a dental survey in an attempt to eliminate all the dental casualties prior to being committed to combat. We also attempted to

stock up on supplies for we did not know when we would receive replacements. We were loaded aboard ships and after we were away from the dock at Yokohama we were informed that we were to go in at Inchon, Korea. While on the water we continued our process of eliminating dental casualties. Some of the ships were equipped with dental clinics but on others we worked from our emergency dental kits, which contained the instruments needed to accomplish extractions and place temporary zinc oxide and eugenol fillings.

After landing at Inchon, it was several days before our trucks and equipment were brought ashore and again our emergency kits were used. For the first few weeks in combat, there was very little for us to do. This was due partly to our efforts to eliminate dental casualties and partly to the fact that everyone was too busy or too scared to worry about their dental health. Some of our dental officers were used where needed in the collecting stations and the clearing stations during this time as auxiliary medical officers to assist in treating casualties.

After the link-up of elements of the 7th Infantry Division and elements of the 1st Cavalry Division driving up from the south, we moved to Pusan where we went through our staging process again and we were able to begin some definitive dental treatment. Each company was informed that dental service was available and the daily workload was tremendous. We again boarded ships and prepared for another amphibious operation—this time on the east coast of North Korea. After landing at Iwon we decided we could place our dental personnel more advantageously. Because during combat we did not need 3 dental officers per regiment and some of the service troops were being neglected, we attached a dental officer to the division replacement company, 1 with the division headquarters company aid station, and 1 with the engineer battalion aid station. We found this to be a much more equitable distribution. We were evacuated from Hungnam, North Korea, to Pusan in December 1950. From our original dental section we had 1 dental officer and 2 enlisted men missing in action.

We went into a rest area to regroup and resupply our division and found that the demand for dental service was staggering. Until this time we had maintained one of the dental operating trucks with the regiments but now found that they moved so frequently that they could not be profitably used. We then decided to assign 1 dental officer to each regiment, 3 with the division artillery (it was easier to get to them because they were not in foxholes like the infantrymen), 1 with the replacement company, 1 with the division headquarters aid station, 1 with the division rear, 1 with the engineer battalion aid station, and to use the rest in a group at one of the clearing stations in a centralized dental clinic. With the 2 dental operating trucks, the dental laboratory truck, and sometimes an additional Chest No. 60 or two we could always handle the overflow from any one place at any given time. As time went on, the maintenance of a central dental clinic in conjunction

with one of the clearing stations proved advantageous. We still needed the minimum dental personnel with the regiments and other small units as mentioned to care for emergencies, accomplish what definitive treatment they could, and screen the prosthetic patients prior to evacuating them to the prosthetic truck. Adjacent to the prosthetic truck we maintained a prosthetic ward. During the early days in Korea, impressions and bites were taken and the soldier was returned to his unit and came back at a later date for insertion of the dentures. This procedure was found not to be practicable because it was difficult for a soldier to get to us and it resulted in too great a loss of man-hours and efficiency. We then decided to have the dental officers out at the units screen all patients needing prosthesis, accomplish all restorative dentistry indicated, and send the patients to the prosthetic ward with sleeping bags and toilet articles where they remained until dentures were inserted. Under this system, the soldier was not traveling back and forth for impressions, bites, try-ins, and insertion. He was available for treatment, his dentures were processed in a minimum of time (usually 48 hours), and he returned to his unit with all dental work completed.

In the early spring our prosthetic workload became so heavy we had to enlarge our facilities and erect a tent laboratory next to the prosthetic truck in order to accomplish the necessary work. This increase was due in part to the fact that the news had spread through the division that prosthetic service was available. During this same interval the dental officer stationed with the replacement company became one of the busiest officers we had. Replacements were arriving rapidly and as part of their processing they were examined by the dental officer. Here again our policy of eliminating the dental casualty proved beneficial, but it placed a heavy burden on the dentist who worked all hours of the day and night performing extractions so that the men could join their units on time. He had authority, however, to hold any man in the replacement company until he could complete the necessary immediate treatment.

While in Korea we rotated the dental officers so that everyone had an equal share of conveniences and inconveniences. On an average, each officer could expect 3 or 4 months with a regiment. Almost all of our dental officers and enlisted personnel were awarded the combat medical badge.

In June we were notified that a Dental Identification Record would have to be made for every officer and man in the division. After securing the forms—40,000 of them—we devised a plan to accomplish the task. Each regimental S-3 saw that they were passed down to the companies, where the company clerk filled in the name, rank, serial number, et cetera, of each man in duplicate. A schedule was set up and a team of 8 dental officers and 10 enlisted men went out to the companies to examine the men and chart the results. With the companies out in the hills, and sometimes only a trail to drive a jeep over, this was a diffi-

cult task, but when I left Korea all of these records for the regiments had been completed.

I departed Korea on 6 August 1951 at which time our division dental section was operating with the minimum dental personnel out with the regiments and other units and with the central dental clinic where definitive, and in some cases elective, dental treatment was being given. With the aid of the operating trucks we were able to (1) reduce and immobilize fractures of the maxilla and mandible, (2) perform sialolithotomies, and (3) remove impactions, dentigerous, radicular, and mucous cysts, and missiles from jaws, faces, and lips. To the best of my knowledge no dental patients were ever evacuated farther to the rear than the medical battalion clearing stations except for fractures or wounds which necessitated a long period of hospitalization. When I left, the report for an average month showed 1,200 permanent restorations, 1,000 extractions, and 80 new dentures in addition to the other treatments performed.

Last but not least, I should like to give praise where praise is due. Without exception we had the finest group of enlisted technicians I have ever seen assembled. These men could assist at the chair, drive a vehicle, change a tire, or put up a tent with equal skill. The laboratory technicians were an untiring crew and turned out a high quality as well as a great quantity of work.

CONCLUSIONS

Dental practice under combat conditions is a challenging and satisfying experience.

The division dental section under the present table of organization and equipment is a vast improvement over that of World War II, but could be further improved.

The Chest No. 60 is a remarkable piece of equipment. Good dentistry can be performed with it in the field and I believe improvements in it are being made.

In addition to the dental prosthetic truck, 3 dental operating trucks should be assigned to a division.

A Brace for Broken Backs[1]

Robert W. Augustine, *Lieutenant Colonel, U. S. A. F. (MC)*
W. E. Landmesser, Jr., *First Lieutenant, U. S. A. F. (MC)*
Mervel V. Parker, *Captain, U. S. A. F. (MC)*
C. D. Martin, *First Lieutenant, U. S. A. F. (MC)*
Otis L. Vaden, *First Lieutenant, U. S. A. F. (MC)*

A BACK brace has been designed for the primary treatment of fractures of the lumbodorsal area of the spine. The brace, which is an improvement on one described by one of us (2), may be used also to prevent flexion deformity of the back in Marie-Struempell disease of the spine and for stability in postoperative states and osteoporosis. It is essentially the effective and widely used Knight spinal brace to which has been added an upper band to maintain extension of the spine. This principle has been used in many braces designed to achieve stability of the lumbodorsal area of the spine and is based on the 3-point principle to maintain extension. The brace possesses several desirable features in its present form. It is largely prefabricated and can be assembled and applied to a patient of any dimensions in 45 minutes. It is supplied by a commercial concern for $40. Furthermore, it is waterproof and can be worn while the patient is taking a bath.

The brace is composed of 2 bands cut to several lengths in prefabricated form, representing the top and bottom of the brace, and 4 upright supports (fig. 1). The lower band is literally wrapped around the patient, below the level of the iliac crests, using care to lock it in front of the anterior iliac spines. This band is cut to the required length and bolted in front, allowing space for the full bladder. The top band circles the chest and is at the level of the tips of the scapulas posteriorly and arches over the pectoral region to lie 1 inch below the suprasternal notch in the midline as a breast pad. Four bars connect the 2 bands, 2 paraspinally and 2 in the axillary lines. Space is allowed in the pectoral area for shoulder motion. The posterior axillary region likewise must have space for fanning of the posterolateral back musculature, but in general the fit must be snug. The breast pad sharply restricts forward flexion. The 2 posterior upright bars are attached

(1) Maxwell Air Force Base, Ala.
(2) Augustine, R. W.: Brace for extension of spine. J. Bone & Joint Surg. 30-A: 784-785, July 1948.

to the upper and lower bands at the described levels. The lateral upright bars are long enough to maintain the desired degree of extension and are bolted to the upper and lower bands. The upper band is cut to the proper circumferential length and bolted in the midline. The assembly is covered with a 1/8-inch thickness of plain gray felt which is glued to the duralumin frame (fig. 2). The felt is quickly covered with plastic friction tape rolled on the frame from a spool and the brace is then complete and waterproof. An extra thickness of padding protects the joints and bolts. Removal is not undertaken until the brace may

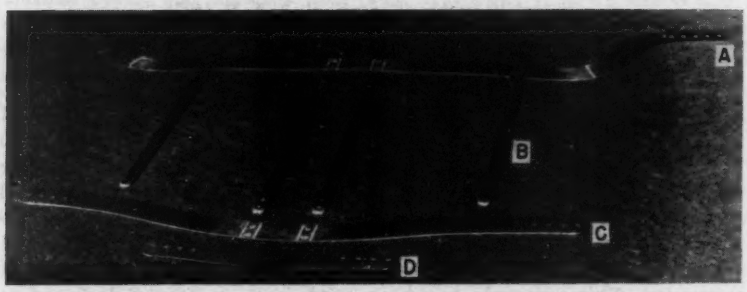

Figure 1. Precut metal parts ready for bending and assembly. (A) *Upper band.* (B) *Upright supports.* (C) *Lower band.* (D) *Pelvic extension.*

be dispensed with. This gives it a unique advantage from the military standpoint. The prefabricated parts consist of (1) upright bars of uniform length which can be cut off as required and (2) upper and lower bands of several lengths to accommodate all body builds.

As applied to broken backs, the brace may be quickly applied tc the patient after reduction has been achieved (fig. 3). If the facets and pedicles are intact and there is no neurologic damage, the patient may be allowed to walk. The brace is used with groin straps to lock the brace firmly onto the pelvis. The degree of extension of the back may be gaged by viewing the lateral profile of the upright patient. Roentgenograms may be taken in this position. The convexity of the paraspinal bars should be made to correspond to the extension of the spine secured at the fracture site. In distinction to plaster casts this extension brace fits the plump, square body build particularly well. The brace allows bathing and adequate ventilation. Viewed from the side on attempted flexion of the spine, the lower band must adhere to the sacrum to which it is locked by fitting closely about the anterior iliac spines. The clothes may be worn over the brace without alteration. Back exercises are a feature of the aftercare. An ileus accompanying a fracture may be cared for easily in the brace. The lateral stability of the lumbodorsal spine is assured by the lateral upright bars attached to the upper and lower encircling bands.

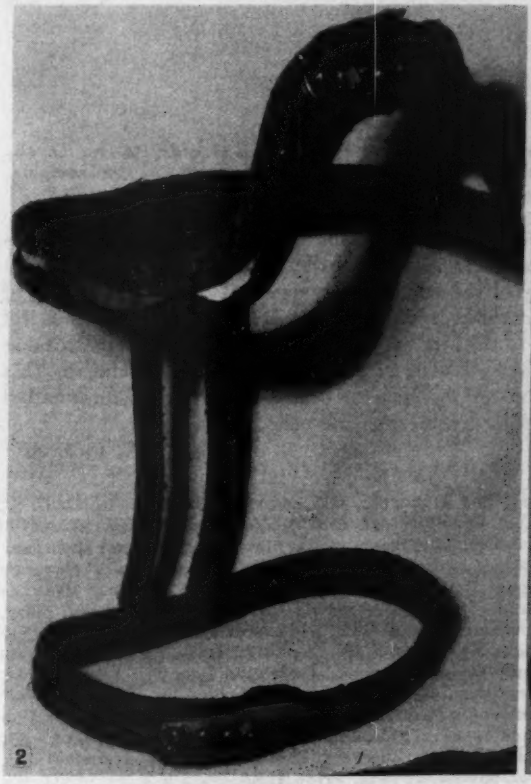

Figure 2. Partially assembled brace showing glued-on, gray, felt cover and bolted upper and lower bands. Proper amount of extension of spine is assured by bending paraspinal bars before the length of the lateral bars (not yet in place) is determined. Figure 3. Lateral view of brace on patient. Note extension of spine with apex at fracture site; the firm grip on the pelvis; groin straps; and abdominal pad.

SUMMARY

A brace for primary treatment of lumbodorsal fractures which offers stability of the lumbodorsal spine in extension is recommended. It consists of a rigid frame bolted onto the patient with firm fixation to the pelvis and adequate bearing surface on the trunk to prevent lateral or forward bending. The brace is economical, nonremovable, allows adequate ventilation, permits bathing, and serves the patient until the fracture has healed.

BOOK REVIEWS

The Practice of Endocrinology, edited by *Raymond Greene,* M. A., D. M., M. R. C. P. 389 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951. Price $12.50.

This excellent book was designed for general practitioners and presents in a clear and lucid manner the details of the anatomy, physiology, and pathology of the endocrine system. The inter-relationship of the endocrine and nervous systems is admirably presented. A useful feature of the book is the list of various endocrine products available for therapeutic employment with an evaluation of their usefulness. This book is recommended for the general practitioner and internist called on to treat patients with disorders of the endocrine system.

—*Col. R. A. Radke, MC, U. S. A.*

Oral Medicine, Diagnosis and Treatment, by *Lester W. Burket,* A. B., D. D. S., M. D., Sc. D., Professor of Oral Medicine and Dean, School of Dentistry, University of Pennsylvania; Professor of Oral Medicine, Graduate School of Medicine, University of Pennsylvania; Honorary Professor, National University, Bogota, Colombia; Chief Oral Medicine Service, Philadelphia General Hospital; Consultant to the Army, Navy, and Veterans Administration, with a Chapter on Oral Cancer by *S. Gordon Castigliano,* B. A., B. S., M. D., F. A. C. S., Chief, Department of Head and Neck Tumors, American Oncologic Hospital, Philadelphia; Professor of Oncology, Temple University School of Dentistry, Philadelphia; Associate in Oncology, Graduate School of Medicine, University of Pennsylvania, Philadelphia. 2d edition. 575 pages; 372 illustrations, including 40 subjects in color. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1952. Price $14.

This book covers a relatively new field in dentistry that has been gaining wide recognition as a clearly defined entity encompassing the inter-relationship between oral and systemic disease. It is primarily designed to meet the needs of the dentist but it will also have great appeal to the oncologist, otolaryngologist, plastic surgeon, and the internist. The book discusses oral lesions for which no local cause is evident and in which an association with a systemic disease appears to be indicated. This new edition contains several noteworthy improvements over the first edition. A section on oral cancer has been added. The information on oral lesions has been greatly expanded. An atlas of 40 representative oral lesions, photographed in full color and reproduced with remarkable clarity and veracity, enhances the value of the book. —*Commander T. A. Lesney, DC, U. S. N.*

March Fracture[1]

Francis D. Threadgill, *Lieutenant Colonel, MC, U. S. A.*

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DURING the year 1951, 91 patients with march fracture were treated at this hospital. These fractures occurred among 107,544 trainees undergoing 8- or 16-week periods of basic infantry training and have resulted in the loss of 5,462 training days, with an estimated hospital expense of $69,766. The rate per thousand was 0.88 for white and 0.33 for nonwhite trainees. This complication in foot soldiers has been studied since 1865 when Breithaupt (2) first recognized the cause of this insidiously developing pain in the forefoot, which is first noticed after prolonged walking. A march fracture may be defined as a dissolution of bone brought on by prolonged walking. Although most common in soldiers, it is seen in waitresses, postmen, and others who walk a great deal. Occasional patients in whom excessive body weight rather than walking seems to have been the precipitating cause are reported (3). Ordinarily the fracture is seen in the second or third metatarsal, but in our series 17 were seen in other locations (table 1).

THE PROBLEM

During and after each war, numerous articles appear on the subject, yet there is a surprising lack of agreement in the conclusions drawn. Opinions as to the seriousness of this malady vary from those of writers who believe that the victim may remain on duty with no treatment other than the wearing of the army shoe to those of certain medical officers in the field who have found that after return to duty these soldiers remain incapacitated over such periods that their presence is detrimental to their unit. We need answers to the following questions: (1) What are the basic causes of this injury? (2) What is the extent of this disability as to loss of manpower and expense to the government? (3) How may the incidence of this complication be reduced by modification of training, without interfering with the effectiveness of the program? (4) Do the sequelas of this injury permanently incapacitate the soldier for infantry duty? (5) How much hospitalization and treatment is necessary to return troops to infantry duty?

(1) From U. S. Army Hospital, Fort Ord, Calif.

(2) Breithaupt, J.: Zur Pathologie des Menschlichen Fusses. Med. Zeit. 23: 169-175, 1855.

(3) Arandes Adan, R.: A proposito de un caso de enfermedad de Deutschlander bilateral. Rev. espan. reum. 3: 31-35, Jan. 1949.

The answers to these questions may be indicated by a correlation of clinical cases with events occurring during basic training and by a study of the duties being performed by soldiers 6 months following discharge from the hospital. In addition, certain fundamental factors in the causation of this fracture may be revealed by such a study.

TABLE 1. *Anatomic distribution of march fractures*

	Number of patients	Days lost	Average
Metatarsal	74	4,162	56
Tibia	13	1,026	79
Os calcis	2	147	74
Femur	2	127	63
Total	91	5,462	60

METHODS AND MATERIAL

The Sixth Infantry Division at Fort Ord is a basic training division consisting of 3 regiments with the mission of giving recruits an 8- or 16-week course of basic training. The companies are commanded by permanent cadre officers and training follows the standardized methods outlined by ATP 21-114. All trainees undergo identical training not modified by physical profile during the first 8 weeks. In February 1952 this program had been changed so that all trainees were given a 16-week course with modification according to the physical ability of certain trainees. This program was not in effect in 1951. Such controlled conditions create a fertile field for studies in physical disability. All patients with fractures were hospitalized in this hospital where a standardized treatment was supervised by 2 medical officers during the year 1951.

PREDISPOSING FACTORS

General. Fort Ord draws troops largely from the southwestern area of the United States. In this territory there are many Mexican-American troops whose diet prior to induction is below standard requirement for adequate body development and maintenance. Many of these people live largely on carbohydrates with low protein, mineral, and vitamin intake. Their usual diet consists largely of beans and commeal. Because of poor bone development they would seem to be predisposed to develop march fractures. That this is the case is shown by the fact that of our 91 patients 15 percent had Spanish names, whereas only 5 percent of the military patients entering the hospital for all causes during the same period had such names.

Although most writers believe that this type of fracture is due to direct bone stress, the vascular elements nourishing the bones contribute to the maintenance of their elasticity and strength. The general health of our patients was, however, sufficient to allow induction. Buchtala and Fuchs (4) stated that most German authors believe a looser zone (or weak area) is caused by primary osseous disease and that the mechanical trauma of walking is the trigger area which initiates fracture through these zones. Such zones with subsequent fracture were produced in the radii of dogs after resection of the associated ulnas. In their discussion of Kuentscher's work on the mechanics of this type of fracture they stated that repetitive weight-bearing experiments using fresh bones covered with a plastic showed that the essential area of weakness was subperiosteal as the fractures produced were always associated with fracture of the plastic in the overlying area.

We have observed in our tibial fractures that the fracture site invariably occurred at the junction of either upper or lower metaphysis and diaphysis. Because these fractures occurred in young trainees it is apparent that these incompletely fused growth areas in effect constitute a looser zone. This observation has given us more confidence in reading roentgenograms of this type of fracture as we are able to focus our attention on susceptible areas. The fracture site in the patient seen early even with this aid, however, is sometimes not detectable for 4 weeks after symptoms have occurred. Fractures in these areas have frequently caused leg pains which we have confused with vascular disease, only to find fracture to be present after a prolonged period of observation. If more obscure abnormalities of vascular origin are a cause of this disability, such factors are not detectable by present methods of physical examination in routine use. In the patients presented, no serious associated diseases such as Raynaud's or Buerger's disease were seen.

Local factors. The general conformity of the foot plays a large part in the production of this fracture in that feet which are poorly shaped are subject to greater stress. Arandes Adan (3) and Dodd (5) believed that march fracture might be due to an abnormally wide separation between the first and second metatarsals resulting from congenital shortness of the first metatarsal, and that such atavism results in unusual stress in the midportion of the second metatarsal. Bernstein et al. (6), however, in an analysis of 692 cases questioned that shortness of the first metatarsal was a causative factor. The single most frequent foot abnormality, flatfoot, does not seem to predispose to this injury.

(4) Buchtala, V., and Fuchs, K. H.: Zur Ätiologie der Looserschen Umbauzonen (schleichende Callusbildung) und der Ermüdungsbrüche am Knochen. Chirurg 21: 143-147, Mar. 1950.

(5) Dodd, H.: Pied forcé or march foot. Brit. J. Surg. 21: 131-144, July 1933.

(6) Bernstein, A., et al.: March fractures of the foot; care and management of 692 patients. Am. J. Surg. 71: 355-362, Mar. 1946.

During the time of this study, 100 consecutive healthy nonwhite trainees were examined for flatfoot; 55 were found to have second or third degree pes planus. These were compared with 100 consecutive white soldiers, 11 of whom were found to have a similar degree of pes planus. The ratio of white to nonwhite hospital admissions (for all causes) was 47:3. When compared with the march fracture series, in which only 2 patients were nonwhite, it is seen that flatfoot does not predispose to

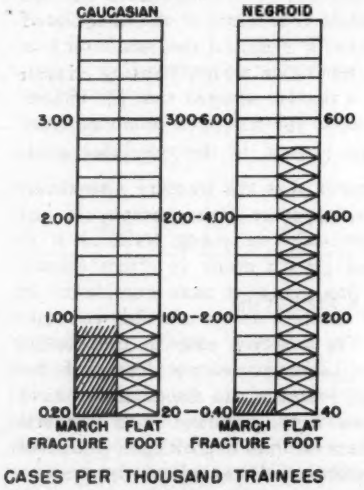

Figure 1. Comparison of incidence of march fracture and flatfoot in white and nonwhite trainees.

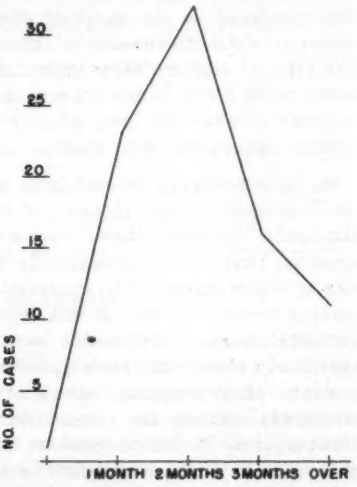

Figure 2. Incidence of march fractures as related to length of time in service.

march fracture (fig. 1). The flat foot is not necessarily a weak foot. The absent or diminished longitudinal arch in the foot, by decreasing the striking angle of the metatarsals, actually diminishes the stress on these bones. This view is supported by the observation of Leavitt and Woodward (7) that pes cavus was seen in 32.5 percent of their series of 47 patients.

Shoes. We are in accord with the belief of Bush (8) that shoes do not predispose to the development of this fracture. The army shoe today is quite different from the stiff, hobnailed variety built on the Munson last and used in World War I. The modern training shoe is a modification of the paratrooper boot, reasonably light in weight, well molded, and usually accurately fitted. It is pliable and breaks in easily. That it is of little significance in the production of march fractures is shown by

(7) Leavitt, D. G., and Woodward, H. W.: March fracture; statistical study of 47 patients. J. Bone & Joint Surg. 26: 733-742, Oct. 1944.

(8) Bush, L. F.: March foot (march fracture); its early diagnosis and treatment. Army M. Bull. 68: 126-134, July 1943.

the fact that over 60 percent of those occurring in our series were incurred after the shoes were well broken in (fig. 2). The protection afforded by this shoe is of great value in the prevention of fractures.

PRECIPITATING CAUSES

The chief precipitating cause is generally agreed to be "rhythmically repeated sub-threshold mechanical insults acting by summation to a point beyond the capacity of the bone to bear stress." (9) Other causes are found where single forceable trauma produces a sudden but similar dissolution of bone. Two fractures in our series were produced by the presently current game of "chicken fighting" in which 2 soldiers engage in the sadistic attempt to jump on their opponent's feet. Such organized recreation is hazardous. Exuberant spirits can be diverted and controlled by less dangerous sports.

Although the basic cause, marching, is a necessary part of the soldier's training, the character of training can be modified so as to lower the incidence of fracture and at the same time give a better type of training. Most march fractures are incurred in the training period. Very few fractures were seen in the European theater in World War II. In present-day combat prolonged and sustained marching is the exception. Because we are training troops to develop combat potency it would appear unwise to cause march fractures by creating conditions which will not be met in the field. Training should produce a soldier with ability to withstand prolonged stress under varied conditions. The time necessary to inculcate the ability to perform repeated road marches without ill effect can be much better spent in other necessary fields in training the modern soldier.

It is impossible to analyze the direct effect of paved roads, rate of marching, and supervision of training because proper controls are lacking. Such factors, however, have undoubtedly influenced the number of march fractures in this series. We believe that the regimental variation observed in reported cases was too great to be due to chance. Because of the many adverse effects the so-called speed march was abolished in this command in July 1951. The fracture rate declined immediately with this change. This decline, however, was largely due to the diminishing number of trainees during this period. Marching on paved roads has long been known to all commands as a prime cause of foot complaints.

TREATMENT

It is folly to continue the once current practice of outpatient treatment for these fractures. Such treatment fixes a pattern of painful foot and will usually result in permanent separation of the patient from the infantry where a useful foot is more necessary than the M-1 rifle.

Early recognition of this injury is necessary so that plantar fixation of the foot may be secured in optimal position to prevent the formation

(9) Lewin, P.: The Foot and Ankle: Their Injuries, Diseases, Deformities and Disabilities. 3d edition. Lea & Febiger, Philadelphia, Pa., 1947.

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of excessive and potentially painful callus. Bernstein et al. *(6)* reported that using the army shoe for fixation and treating patients on an outpatient status results in complete recovery. They further stated that these troops subsequently make as able a soldier as those who have not had a march fracture.

We have found that the use of a walking plaster leg-and-foot cast, incorporating an adequate arch support on an inpatient status, results in an early deposit of callus without excessive bone formation and later limitation of mobility of the foot. The arch support is incorporated to insure proper support while the cast is worn. Muscular atrophy and prolonged residual weakness is prevented by moderate walking in the cast which allows ample muscular action. The cast is maintained until activity of the new bone is stopped, usually from 6 to 8 weeks. After this time the soldier can quickly begin extensive walking and is returned to duty. Although such a method results in prolonged hospitalization, the ultimate return of the infantry soldier to full duty is achieved. Of our 32 patients available for study 6 months after return to duty, 29 had completed basic training and remained on duty with a class A profile.

Basic training must be completed before a soldier can be assigned to a combat unit. If a soldier is able to avoid any type of training, he invariably becomes an administrative problem and frequently is a liability rather than an asset to the service. Effective disposition is thus a necessary obligation of the medical department. We are, therefore, unable to agree with Bernstein et al. *(6)* and Dew and Wooten *(10)* that outpatient treatment is a satisfactory method of handling most of these patients. The question of separation of these troops following recovery may be answered by the fact that only 3 of 32 patients were not performing full field duty 6 months after hospitalization. Of these 3 patients, 2 were separated for causes other than the march fracture and 1 was transferred to the Medical Service for duty.

RECOMMENDATIONS

Speed marches, if deemed essential, should be delayed until after at least 8 weeks of basic training. Road marches should be performed on dirt roads. Paved parade grounds and paved roads should be avoided. Recreation should be supervised to eliminate hazardous games in which soldiers deliberately attempt to inflict injury. Adequate and nutritious diet will increase the ability of bone to withstand stress.

SUMMARY

In a series of 91 march fractures the greatest incidence was found in the eighth to tenth week of basic training. The nutritional standards of

(10) Dew, W. A., and Wooten, J. H., Jr.: March fractures, series of 58. Mil. Surgeon 95: 356-359, Nov. 1944.

inductees prior to entering the service was a predisposing factor. Long road marches and speed marches given before proper conditioning had been achieved and hazardous sports performed during off duty hours were precipitating factors. Patients with march fracture require prolonged hospitalization, but if the fracture is properly treated the soldier can be returned to full infantry duty.

BOOK REVIEWS

Medical Disorders of the Locomotor System, including the Rheumatic Diseases, by *Ernest Fletcher,* M. A., M. D. (Cantab.), M. R. C. P., Physician-in Charge of the Department of Rheumatism and Lecturer on the Rheumatic Diseases, Royal Free Hospital; Approved University Teacher, University of London; Physician to the Arthur Stanley Institute, Middlesex Hospital; Consulting Physician to Queen Mary's Hospital for the East End; Heberden Medallist and Lecturer in Rheumatism; Member of the Scientific Advisory Committee, Empire Rheumatism Council; late Physician-in-Charge of a Medical Division, Emergency Medical Service, Ministry of Health; Consulting Physician to the Kent County Council. 2d edition. 884 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951. Price $11.

This book by an outstanding British rheumatologist is attractively bound and clearly printed. The illustrations are plentiful and of good quality. The basic science approach to rheumatology is stressed. The anatomy and physiology of the joints and contiguous structures are presented in detail. This section affords a review that will benefit the specialist as well as the neophyte in rheumatic diseases.

Several classifications of joint disease are outlined and discussed; included is the American Rheumatism Association classification on which favorable comment is made. The section on rheumatoid arthritis is complete and reflects the Continental viewpoint. Rheumatoid spondylitis is considered a separate disease under the heading of ankylosing spondylitis (Marie-Struempell's). The therapeutic mainstay is gold salt therapy. The pituitary hormone and adrenal cortical steroids are mentioned therapeutically but with justifiable conservatism. The term "rheumatoid syndrome" is used throughout the text and such entities as Still's disease, Reiter's disease, palindromic rheumatism, psoriatic arthritis, and the like are classified as possible variants of rheumatoid arthritis, which is in conformity with the views of many authorities in this country. The relationship of rheumatic fever to rheumatoid arthritis is discussed and illustrative cases are presented. The author favors the concept that the 2 diseases are separate entities. The sulfonamide prophylaxis of rheumatic fever is outlined in detail, but the oral use of penicillin is mentioned only briefly.

Fibrositis is discussed by Dr. W. S. C. Copeman who leaves little doubt that such a condition exists and is a definite syndrome. American rheumatologists and internists have been slow to recognize this condition and could profitably peruse this chapter.

There are many excellent chapters on "locomotor disorders." Of special interest are those on the neuropathies, peripheral vascular disease, radiology in arthritis, and the section on osteoarthritis. Cortisone and ACTH are covered in appendix 1, giving their physiologic action, dosage, and recommended usage. This book can be recommended without reservation to all physicians interested in arthritis, not only as an office reference, but as a text to be read and reread.

—*Col. L. J. Numainville, MC, U. S. A.*

The 1951 Year Book of Orthopedics and Traumatic Surgery November 1950—November 1951), edited by *Edward L. Compere,* M. D., F. A. C. S., Associate Professor of Bone and Joint Surgery, Northwestern University Medical School; Chairman, Departments of Orthopedic Surgery, Wesley Memorial and Children's Memorial Hospitals; Consultant Orthopedic Surgeon, Chicago Memorial Hospital; Consultant in Orthopedics, U. S. Naval Hospital, Great Lakes, Ill. 380 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1952. Price $5.50.

This small, readable summary of the year's pertinent orthopedic literature is a must on the reading list of all orthopedic surgeons. It is advertised by the publishers as a handbook for those who have been too busy through the year to read all the literature and their statement seems to indicate that the average surgeon would read all the summarized literature in this book if he only had the time. I appreciate the tact with which this statement was placed in the advertisement. I must immediately point out that the literature covered by this small book extends from journals of roentgenology to journals of basic sciences and it would be a most unusual man who would read all of the original articles. These articles have been skillfully abstracted with reproductions of photographs and pertinent graphs. I thoroughly enjoyed the editorial comments and I should like to see this phase of the book increased. There are many articles in this year book that well deserve editorial comment either to point out a lack of prior perusal of the literature in preparation of the articles or to point up the merits of the unusually sound conclusions of an author. The editors are to be congratulated on another year of excellent work in preparation of this summary of the current literature.

—*Commander H. T. Stradford, MC, U. S. N.*

A Sandal for Use With Traction Suspension Apparatus

Cornelius J. Kraissl, *Colonel, U. S. A. F. (MC)* (1)

TRACTION suspension apparatus will be used for temporary or permanent treatment of injuries of the lower extremities for many years despite recently popularized orthopedic operations. The necessity for the prevention of foot drop has been appreciated by all who use this type of apparatus. Usually moleskin or adhesive has been bandaged to the foot and counterbalanced to keep the foot in a position of dorsiflexion. Any type of adhesive material applied to the skin for any period of time, particularly if any tension is applied, can be expected to result in skin irritation and possibly vesicle formation. An immobile support for the foot prevents muscular exercise and may cause atrophy and joint stiffness.

In 1932 a sandal to prevent foot drop was described (2). Its advantages were ease of removal for foot hygiene, avoidance of skin irritation, and comfort of the patient. Several improvements are now suggested: (1) the sole should be more rigid than the rest of the sandal, (2) the side pieces and tongues should be made of soft horsehide, and (3) the heel piece should be curved to fit the Achilles tendon so that the weight is distributed evenly. These sandals may be made easily in the occupational therapy department as soft leather is usually available (fig. 1). The following materials and specifications are suggested:

Sides: horsehide, cream, medium weight 3½ to 4 oz. (item 12-480-350) (3).

Sole: leather, cow, russet, 5 to 6 oz. (item 12-480-210) (3).

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(1) U. S. Air Force Hospital, March Air Force Base, Calif., at time of writing this article; now at U. S. Air Force Hospital, Travis Air Force Base, Calif.

(2) Kraissl, C. J.: Sandal for prevention of foot-drop for use with traction-suspension apparatus. J. Bone & Joint Surg. 14: 969-971, Oct. 1932.

(3) Armed Services Catalog of Medical Materiel, July 1949.

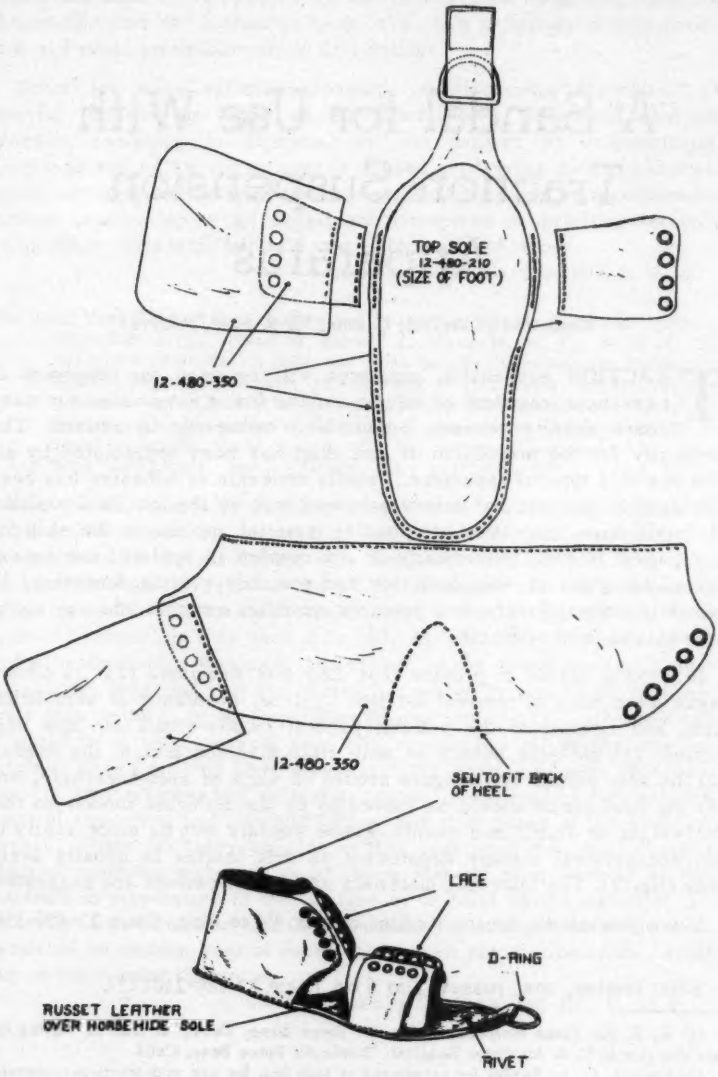
TOP SOLE
12-480-210
(SIZE OF FOOT)
12-480-350
12-480-350
SEW TO FIT BACK OF HEEL
LACE
D-RING
RUSSET LEATHER OVER HORSEHIDE SOLE
RIVET

Figure 1.

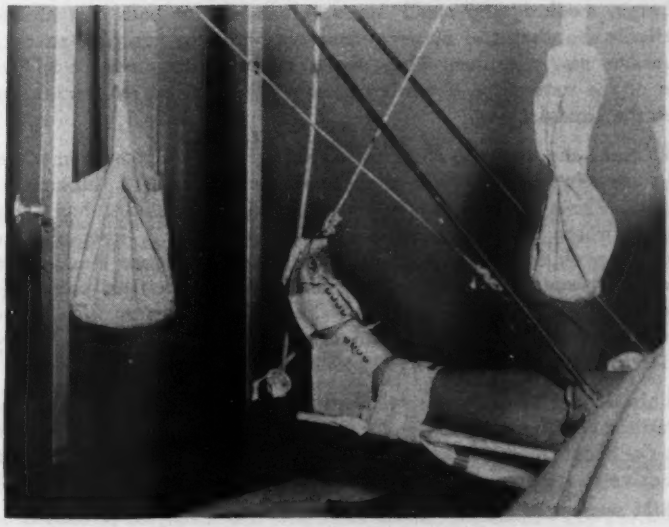

Figure 2. Dorsomedial view showing counterbalanced support.

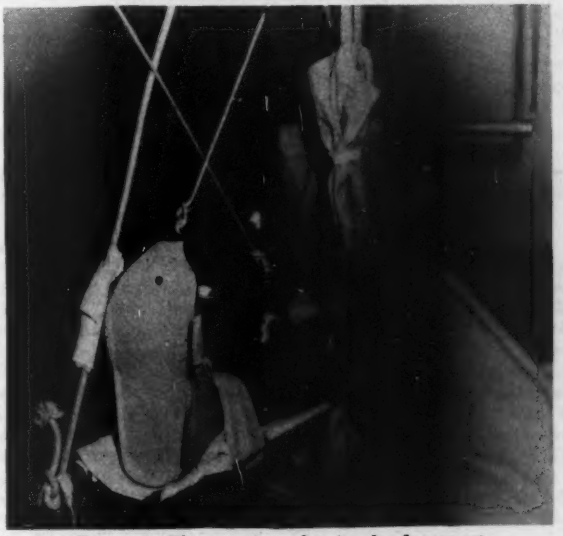

Figure 3. Plantar view showing heel support.

Large, medium, and small sizes of sandals for both feet should be available so that the surgeon first applying the traction suspension apparatus may use them. They should prevent skin pressure and irritation of the extremity. A woolen sock may be put on for warmth and to keep the sandal clean.

To make the sandals, the cutout side pieces of chrome-tanned horsehide are sewed to the sole piece which consists of 2 thicknesses of leather. The outer part is similar to the side pieces and has a tongue through which the 1 1/4-inch D-ring is riveted. This rivet also holds the soft cowhide inner sole to the sole piece which are glued together. The side pieces have eyelets, as indicated, and attached soft tongues. The heel piece has a tuck in it to make it fit snugly around the Achilles tendon. The counterbalance consists of from 2 to 4 pounds adjusted to obtain slight dorsiflexion (figs. 2 and 3).

This sandal should be particularly useful in connection with an apparatus used for by-passing the foot, described by Spittler and Brennan *(4)* because motion of the foot is permitted. The sandal has proved effective in its primary purpose of preventing foot drop because it gives mobile support of the foot in a position of slight dorsiflexion.

(4) Spittler, A. W., and Brennan, J. J.: Foot by-pass apparatus for treating fractures of femur. U. S. Armed Forces M. J. 2: 1389-1390, Sept. 1951.

BOOKS RECEIVED

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Working Programs in Mental Hospitals, Proceedings of the Third Mental Hospital Institute held under the auspices of the Mental Hospital Service of the American Psychiatric Association, Kentucky Hotel, Louisville, Ky., October 15-18, 1951. Edited by *Daniel Blain,* M. D., Medical Director, A. P. A., with the *Staff of the A. P. A. Mental Hospital Service.* 203 pages. American Psychiatric Association, Washington, D. C., publisher, 1952. Price $2.50.

Mental Disorders, Diagnostic and Statistical Manual, prepared by *The Committee on Nomenclature and Statistics of the American Psychiatric Association.* 130 pages; illustrated. American Psychiatric Association, Mental Hospital Service, Washington 6, D. C., publisher, 1952. Price $1.50.

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Dynamic Psychiatry, Basic Principles, Volume One, by *Louis S. London,* M. D. 98 pages. Corinthian Publications, Inc., New York, N. Y., publisher, 1952. Price $2.

Hemifacial Spasm, A Clinical and Pathophysiological Study, by *Robert Wartenberg,* M. D., Foreword by *Macdonald Critchley,* M. D. 86 pages; illustrated. Oxford University Press, New York, N. Y., publisher, 1952. Price $4.

Essentials in Diseases of the Chest for Students and Practitioners, by *Philip Ellman,* M. D., F. R. C. P., Consultant Physician in Diseases of the Chest to the North-East Metropolitan Regional Hospital Board at East Ham Chest Clinic, Harts Sanatorium and Plaistow Hospital Chest Unit, London; Consultant Physician St. Stephen's Hospital (Rheumatism Unit), London and Dorking General and Leatherhead Hospitals; Lately Physician in Charge Medical Division, Leatherhead Emergency Hospital of King's College Hospital; Editor British Journal of Tuberculosis and Diseases of the Chest, With a Foreword by *Sir Robert A. Young,* C. B. E., M. D., F. R. C. P., Hon. Consultant Physician to the Middlesex Hospital and to the Brompton Hospital; Consulting Physician to King Edward VII Sanatorium, Midhurst; Vice-Chairman of the Council of the National Association for the Prevention of Tuberculosis. 400 pages; illustrated. Geoffrey Cumberlege, Oxford University Press, New York, N. Y., publisher, 1952.

Spatial Vectorcardiography, by *Arthur Grishman,* M. D., Adjunct Physician for Cardiology, The Mount Sinai Hospital, New York; Adjunct Physician in Medicine and Assistant Roentgenologist, Beth Israel Hospital, New York; Former Adjunct Attending Physician in Medicine and Assistant Roentgenologist, The Montefiore Hospital, New York, and *Leonard Scherlis,* M. D., Research Assistant in Cardiology, The Mount Sinai Hospital, New York. 217 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Etiology and Diagnosis in the Treatment of Infertility in Men, by *Robert S. Hotchkiss,* M. D., Professor and Chairman, Department of Urology, New York University, Post Graduate Medical School, Visiting Surgeon-in-Charge (Urology), Bellevue Hospital, Visiting Surgeon-in-Charge (Urology), University Hospital. American Lecture Series Publication No. 53, A Monograph in American Lectures In Endocrinology. 73 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.50.

Surgical Gynecology, A Handbook of Operative Surgery, Including Important Obstetric Operations, by *J. P. Greenhill,* M. D., Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Attending Obstetrician and Gynecologist, Michael Reese Hospital. 350 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $8.50.

Essentials of Public Health, by *William P. Shepard,* B. S., M. D., M. A., with the collaboration of *Charles Edward Smith,* M. D., D. P. H., *Rodney Rau Beard,* M. D., M. P. H., *Leon Benedict Reynolds,* A. B., Sc. D. Foreword by *Ray Lyman Wilbur,* M. D., LL. D., Sc. D., Chancellor, Stanford University; Ex-Secretary of the Interior; Formerly President of Stanford University. 2d edition. 581 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1952.

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Biochemistry for Medical Students, by *William Veale Thorpe,* M. A. (Cantab.), Ph. D. (Lond.), Reader in Chemical Physiology, University of Birmingham. 5th edition. 528 pages; 41 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1952.

Bone Tumors, by *Louis Lichtenstein,* M. D., Senior Pathologist, General Medical and Surgical Hospital, Veterans Administration Center, Los Angeles; Formerly Associate Pathologist, Hospital for Joint Diseases, New York; Consultant in Bone Tumors, Tumor Registry of the California Medical Association Cancer Commission; Sometime Lecturer in Bone Pathology, Medical Extension, University of California at Los Angeles. 315 pages; 155 illustrations. The C. V. Mosby Co., St. Louis, Mo., publisher, 1952. Price $10.50.

Surgical Forum, Proceedings of the Forum Sessions, Thirty-Seventh Clinical Congress of the American College of Surgeons, San Francisco, Calif., November, 1951. Surgical Forum Committee, *Owen H. Wangensteen*, M. D., F. A. C. S., Minneapolis, Chairman; *Warren H. Cole*, M. D., F. A. C. S., Chicago; *Robert E. Gross*, M. D., F. A. C. S., Boston; *Michael L. Mason*, M. D., F. A. C. S., Chicago; *Carl A. Moyer*, M. D., F. A. C. S., Dallas; *I. S. Ravdin*, M. D., F. A. C. S., Philadelphia. 667 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

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Elementary Medical Statistics, The Principles of Quantitative Medicine, by *Donald Mainland*, M. B., Ch. B., D. Sc., F. R. S. E., F. R. S. C., Professor of Medical Statistics, Division of Medical Statistics, the Department of Preventive Medicine, New York University College of Medicine. 327 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Simplified Arithmetic for Nurses, by *M. Esther McClain*, R. N., M. S., Instructor in Nursing Arts, Providence Hospital School of Nursing, Detroit, Mich. 151 pages. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Orthodontics, Diagnosis, Prognosis, Treatment, by *Bercu Fischer*, D. D. S. 334 pages; 1180 illustrations on 212 figures. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

A Textbook of Histology, by *Alexander A. Maximow*, Late Professor of Anatomy, University of Chicago, and *William Bloom*, Professor of Anatomy, University of Chicago. 6th edition. 616 pages; 986 illustrations, 257 in color, on 580 figures. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Fundamentals of Neurology, by *Ernest Gardner*, M. D., Professor of Anatomy, Wayne University College of Medicine, Detroit. 2d edition. 359 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Advances in Medicine and Surgery, From the Graduate School of Medicine of the University of Pennsylvania. 441 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

A Textbook of Pharmacology, Principles and Application of Pharmacology to the Practice of Medicine, by *William T. Salter*, M. D., Professor of Pharmacology, Yale University School of Medicine. 1240 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1952.

Clinical Applications of Recreational Therapy, by *John Eisele Davis*, Sc. D., Chief, Corrective Therapy, the Veterans Administration, Washington, D. C. American Lecture Series Publication Number 123, A Monograph in American Lectures in Physical Medicine. 118 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $3.75.

Congenital Dysplasia of the Hip Joint and Sequelae (In the Newborn and Early Postnatal Life), by *Vernon L. Hart*, M. D., F. A. C. S., Assistant Professor of Surgery, University of Minnesota, Minneapolis, Minn. Detroit Orthopaedic Lecture, Auspices of the Wayne County Medical Society, Detroit, Mich., December 6, 1948. American Lecture Series Publication Number 102, A Monograph in American Lectures in Surgery. 187 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952.

Studies on Testis and Ovary Eggs and Sperm, Proceedings of a Conference, Sponsored by the Committee on Human Reproduction, National Research Council, in behalf of the National Committee on Maternal Health, Inc., edited by *Earl T. Engle,* 237 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $7.50.

The Apologie and Treatise of Ambroise Paré, Containing the Voyages Made into Divers Places, With Many of His Writings Upon Surgery, edited and with an Introduction by *Geoffrey Keynes,* M. D., F. R. C. S., F. R. C. O. G. 227 pages; illustrated. The University of Chicago Press, Chicago, Ill., publisher, 1952. Price $3.50.

The Scalp in Health and Disease, by *Howard T. Behrman,* A. B., M. D., Assistant Clinical Professor of Dermatology, New York University Post-Graduate Medical School; Adjunct Dermatologist, Mount Sinai Hospital; Attending Dermatologist, Hillside Psychiatric Institute; Formerly Associate Dermatologist, Bellevue Hospital, and Assistant Attending Dermatologist, University Hospital; Fellow in Dermatology, New York Academy of Medicine; Member, Committee on Cosmetics, American Medical Association; Society of Cosmetic Chemists; Society for Investigative Dermatology; Fellow, American Academy of Dermatology; Diplomate, American Board of Dermatology. 566 pages; 312 illustrations. The C. V. Mosby Co., St. Louis, Mo., publisher, 1952. Price $12.50.

Lung Abscess, by *R. C. Brock,* M. S., F. R. C. S., F. A. C. S., Thoracic Surgeon to Guy's Hospital; Surgeon to the Brompton Hospital; Formerly Consulting Thoracic Surgeon to the London County Council. 197 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $7.75.

Orthopaedic Appliances Atlas. Volume 1, Braces, Splints, Shoe Alterations, a Consideration of Aids Employed in the Practice of Orthopaedic Surgery. Published under the Auspices of *The American Academy of Orthopaedic Surgeons, Inc.,* in Cooperation with *Office of the Surgeon General, U. S. A.,* and the *Veterans Administration,* Department of Medicine and Surgery. 588 pages; illustrated. J. W. Edwards, Ann Arbor, Mich., publisher, 1952. Price $10.

Diagnostic Electroencephalography, by *Hans Strauss,* M. D., Associate in Neurology in Charge of Electroencephalography, Mount Sinai Hospital and Hospital for Joint Diseases, New York City; *Mortimer Ostow,* M. D., Sc. D. (Med.), Adjunct in Neurology in Charge of Electroencephalography, Beth Israel Hospital; Adjunct in Neurology for Electroencephalography, Mount Sinai Hospital, New York City; and *Louis Greenstein,* M. D., Adjunct in Neurology for Electroencephalography, Mount Sinai Hospital, New York City. 282 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1952. Price $7.75.

BOOK REVIEWS

Monographs on Surgery—1952, edited by *B. Noland Carter,* M. D., Ph. D., Professor of Surgery, University of Cincinnati; Director of the Surgical Services, Cincinnati General Hospital. Advisory Editors: Gynecology, *Joe V. Meigs,* M. D., Clinical Professor of Gynecology, Harvard University Medical School; Chief of the Vincent Memorial Hospital; Urology, *Charles Huggins,* M. D., Professor of Urology, the University of Chicago; Chairman of Committee on Cancer, the University of Chicago; Orthopedic Surgery, *Alfred R. Shands,* M. D., Medical Director, Alfred I. duPont Institute of the Nemours Foundation. 430 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1952.

This is a third volume in a series that replaces the previously published Nelson's Loose Leaf Surgery. This work consists of a heterogeneous collection of subjects of particular interest to the specialist in urology, orthopedics, and gynecology as well as to the general surgeon.

The first paper is by Whipple who discusses radical operations for pancreaticoduodenal cancer. He revived pancreatic operations 7 years ago and has had a wide experience in this field. Although he still considers involvement of the portal or superior mesenteric veins with tumor tissue an absolute contraindication to operation, Child et al. have recently shown that these veins can be successfully resected. Curtis presents a resume of the use of radioactive iodine in the management of thyroid disease and stresses its definite though limited use in the treatment of thyroid malignancy. A very practical discussion of the management of acute chest injuries by Blades should be of great interest to the general surgeon. A method for producing prolonged intercostal analgesia is described and should be very useful in certain selected cases.

A series of papers devoted to incontinence in women is presented. A new conception of the mechanism of micturition and urinary control that permits a more rational approach to the treatment of this distressing condition is given. In this series Kegel describes a physiologic therapy of urinary stress incontinence consisting of muscle education and resistive exercises of the perivaginal muscles, the pubococcygeus being considered the most important. The orthopedic section includes articles on aseptic necrosis of the femoral head, intracapsular fractures of the femoral neck, and arthoplasty and fractures of the shafts of long bones. Eggers stresses the importance of the use of a slotted type of plate or internal contact splint in the immobilization of fractures. This

allows the fractured ends after reduction to remain in contact and the fractured ends to receive the contact compression forces which the muscles normally exert on injured bone. He shows experimentally and clinically that this longitudinal pressure exerted on the fractured ends of bones stimulates bone healing.

The 2 articles in the section on urology should be of interest to the general surgeon as well as the urologist. Hinman discusses congenital ureteral and pelvic dilatation and seems to present conclusive evidence that fetal renal function exists. He maintains that even when the site or structure hindering the urinary flow cannot be found, the changes in the upper urinary tract are indistinguishable from those with a definite obstructive lesion and, therefore, should receive the same therapeutic measures of release of the obstruction or diversion of the urinary stream. Renal neoplasms are discussed by Whitmore and he presents an excellent, all-inclusive classification of these tumors. Operations on the large arteries are discussed in the final article by Freeman who gives the historical background that led to modern principles of arterial suture and the use of venous transplants and shunting procedures. In addition, he discusses visualization of blood vessels by the injection of contrast media.

Each of these contributions is written by men of vast experience in the particular subject under perusal. They are well illustrated and represent a critical evaluation of problems of real significance in modern surgery.—*Lt. Comdr. R. L. May, MC, U. S. N.*

The Musculoskeletal System, A Symposium Presented at the Twenty-Third Graduate Fortnight of the New York Academy of Medicine, October Ninth to Twentieth, 1950, edited by *Mahlon Ashford,* M. D. 368 pages; illustrated. The Macmillan Co., New York, N. Y., publishers, 1952. Price $6.50.

This book is an outstanding contribution to medical literature and is of international importance. The musculoskeletal system is described from the viewpoint of its structure, biologic chemistry, and physiology. A discussion of those diseases directly involving the musculoskeletal system and a further discussion of certain subjects closely related but not limited to that system, such as skeletal changes associated with diseases of the blood, clinical effects of cortisone and ACTH, uric acid metabolism and gout, and the collagen diseases, are also included. The illustrations are numerous and are reproduced with remarkable clarity. The subject matter in general is briefly but clearly presented and is well documented. For this reason the book is recommended to physicians of every branch, specialty, or subspecialty of medicine. The 17 contributors are each authorities in their respective fields. Since the subject matter was presented originally in October 1950, the value of this book might have been greater if publication and release could have been made during 1951 rather than 1952. Little of the information presented is out of date, however, and some revision of the

subject matter to bring it up to date was probably made prior to publication, as evidenced by the fact that frequent references are made to supporting articles which were not published until 1951.

—*Col. A. A. Biederman, MC, U. S. A.*

Surgical Gynecology, A Handbook of Operative Surgery, Including Important Obstetric Operations, by *J. P. Greenhill,* M. D., Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Attending Obstetrician and Gynecologist, Michael Reese Hospital. 350 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $8.50.

Except for about 64 pages in the front of the book covering preoperative and postoperative care of the patient and the complications which plague the surgeon, this manual is devoted to pictorally presenting most of the gynecologic procedures encountered in the operating room. The author makes no attempt to treat these subjects exhaustively nor does he go into minute detail explaining the illustrations of the various operative procedures. He leaves these details for the reader to look up if he is so inclined. The drawings depicting the operative procedures are clear and, with the short description on the opposite page, are easily followed step by step. This handbook has its greatest use in refreshing the surgeon's mind regarding the various steps involved in a gynecologic procedure without having to wade through a mass of details. As the author puts in in his preface, "This handbook was prepared for young gynecologists, general surgeons and those physicians in general practice who also perform operations."

—*Lt. Col. J. H. Smith, MC, U. S. A.*

Current Therapy 1952, Latest Approved Methods of Treatment for the Practicing Physician. Editor, *Howard F. Conn,* M. D.; Consulting Editors, *M. Edward Davis, Vincent J. Derbes, Garfield G. Duncan, Hugh J. Jewett, William J. Kerr, Perrin H. Long, H. Houston Merritt, Paul A. O'Leary, Walter L. Palmer, Hobart A. Reimann, Cyrus C. Sturgis,* and *Robert H. Williams.* 849 pages. W. B. Saunders Co., Philadelphia, Pa., publishers, 1952.

This is an oversized volume printed on a good quality of paper. The consulting editors and contributors are outstanding in their respective fields. The book is divided into sections devoted to (1) infectious diseases, (2) diseases of the respiratory system, (3) diseases of the cardiovascular system, (4) diseases of the blood and spleen, (5) diseases of the digestive system, (6) disorders of metabolism, (7) diseases of the endocrine system, (8) diseases of the urogenital tract, (9) the venereal diseases, (10) the allergies, (11) diseases of the skin, (12) diseases of the nervous system, (13) diseases of the locomotor system, (14) obstetrical and gynecologic diseases, and (15) diseases due to chemical and physical agents. The therapy used by the respective contributors is presented in outline form. The treatment of many diseases is discussed by 2 or more contributors. The latest methods of therapy, in-

cluding those still experimental, are discussed, but emphasis is placed on the commonly accepted therapeutic measures. The appendix contains a useful alphabetical list of drugs, including the name of the manufacturer and package information. The index is excellent, affording ready reference to the various diseases and therapeutic agents. This book is highly recommended to all practitioners of medicine.

—*Col. F. H. Mowry, MC, U. S. A.*

Rx for Medical Writing, A Useful Guide to Principles and Practice of Effective Scientific Writing and Illustration, by *Edwin P. Jordan,* M. D., and *Willard C. Shepard.* 112 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1952.

Except for the chosen few who have had long experience or to whom writing comes naturally, the preparation of a medical manuscript looms as a forbidding task. This concise and lucid guide to good medical writing should be studied by all prospective authors. Its avowed purpose is to help them say what they mean and avoid faults which so commonly prevent a paper from doing justice to the work on which it is based. Following an original rapid writing of an article or book, the authors recommend a minimum of 3 revisions, the first reorganizing the work as a whole, the second improving the style, and the third perfecting details. Practical suggestions are made for dealing with special problems such as protocols, case reports, indexing, and proofreading. The chapters on the choice and preparation of illustrations and the correct employment of statistics are particularly valuable.

—*Capt. B. F. Avery, MC, U. S. N.*

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